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ABSTRACT

Undergraduate education majors in a teacher preparation program completed a computer-assisted instructional program for a study designed to examine the effects of type of instructional control and program mode on the achievement, option use, time spent on program, and attitudes of higher and lower ability students. Students were assigned to high and low-ability groups based on Scholastic Aptitude Test (SAT) and American College Testing Assessment (ACT) scores. Four versions of a computer-delivered program on competency-based instruction were created by crossing the two control conditions (learner control, program control) with the two program modes (full, lean). Subjects in the full-program control group were required to complete all questions. Subjects in the full-learner control group were presented with the entire set of questions, but given choices of how many and which questions they wished to complete. Subjects in the lean-program control group were given fewer questions than in the full program, and required to complete all. Subjects in the lean-learner control group were given options to complete fewer questions or to answer additional questions for further practice. Results include: (1) subjects in the full program scored significantly higher on the posttest than those in the lean program; (2) higher-ability students scored significantly higher than lower-ability students; (3) learner-control subjects chose to view 68% of the optional screens in the full program but only 35% in the lean program; (4) subjects spent significantly more time on the full version; and (5) subjects had more favorable attitudes toward learner control than program control. Appendices include the "Teaching for Competence" instructional program and student posttest and attitude questionnaire. (Contains 30 references.) (SWC)

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LEARNER CONTROL OVER FULL AND LEAN COMPUTER-BASED INSTRUCTION UNDER DIFFERING ABILITY LEVELS

by

Heidi L. Schnackenberg

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A Dissertation Presented in Partial Fulfillment
of the Requirements for the Degree
Doctor of Philosophy

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May 1997

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ABSTRACT

This study examined the effects of type of instructional control and program mode on the achievement, option use, time in program, and attitudes of higher-ability and lower-ability university students. Ability level was determined using subjects' SAT and ACT scores.

The instructional materials for the study were four versions of a computer-delivered instructional program on Competency-Based Instruction created by crossing the two control conditions (learner control, program control) with the two program modes (full, lean). Subjects were randomly assigned to the four program versions within higher-ability and lower-ability groups. The program-control versions consisted of a fixed number of screens to be completed by students, 196 in the lean version and 240 in the full one. Each student under learner control could add optional practice screens to the lean version or delete optional practice screens from the full one, enabling them to adjust the length of their program version between 196 and 240 screens.

Subjects in the full program scored significantly higher on the posttest than those in the lean program, and higher-ability students scored significantly higher than lower-ability students. Posttest achievement did not differ significantly by type of control. Learner-control subjects chose to view 68% of the optional screens in the full program but only 35% in the lean one, and subjects also spent significantly more time in the full version. Subjects had more favorable attitudes towards learner control than program control.

The higher achievement for students in the full version of the program was most likely due to their greater amount of practice, both under program and learner control. That subjects under learner control chose to view many more optional screens in the full program than in the lean one reveals a tendency for

many students to follow the default path through their assigned program. The overall results of the study indicate that a relatively full version of an instructional program is more effective for improving student achievement, and that learner control in an instructional program is more appealing to students than program control.

For my sister Kimmy,

who taught me what perseverance and

overcoming obstacles are all about.

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To my Dad. Thank you for always showing me the person that I would like to become. Your perpetual smile and kind words for all that you meet show me that the true accomplishment of a lifetime is to be happy and well-loved.

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To God in heaven through whom all good things come. Thank you for teaching me that "faith is being sure of what we hope for and certain of what we cannot see" (Hebrews 11:1) and that "there is a time for everything" (Ecclesiastes 3:1-15). These are by far the most important lessons I have learned in graduate school.

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CHAPTER I

INTRODUCTION

The idea of learner control over instruction has enjoyed increasing popularity as a result of the growth of computer-assisted instruction in the schools. Several researchers have investigated the effects of allowing learners to choose the amount of practice, feedback, and review they desire as they progress through computer-assisted instructional programs (Carrier, Davidson, Williams, & Kalweit, 1986; Hicken, Sullivan, & Klein, 1992; Kinzie, Sullivan, & Berdel, 1988). Other researchers have allowed learners to choose the method of instructional delivery, such as lecture or group discussion (Pascal, 1971), or the size of the group in which they wish to work (Peterson & Janicki, 1979). Still others have explored learner control by matching student preferences for amount of instruction with the amount they receive (Freitag & Sullivan, 1995; Hannafin & Sullivan, 1996).

Popular argument states that learner control is intrinsically appealing because it allows learners to tailor elements of instruction to their individual needs and preferences. Steinberg (1977) claimed that learner control can alleviate boredom, anxiety, and frustration, while maintaining learner attention and increasing motivation . Nevertheless, research has yielded inconsistent results regarding the benefits of learner control on learner achievement.

Some research results indicate that individuals learn more when given control over their instruction. Ross, Morrison, and O'Dell (1989) reported that higher posttest scores were obtained by undergraduate education majors who were allowed to select the instructional presentation medium than by students who were not. Kinzie, Sullivan, and Berdel (1988) found that eighth-grade science students given control over reviewing content scored higher on a

posttest than students who were not given this option. Gray (1987) reported that college students having control over the sequencing of instructional content in an introductory sociology class scored higher on a retention measure than students without sequencing control. In Tennyson's research, twelfth-grade students enrolled in a psychology class benefited from controlling elements of their instruction, but only when informed about their own particular strategies for learning a task (Tennyson & Buttrey, 1980).

Other research indicates that individuals learn less effectively when given control over their instruction. Carrier, Davidson, Higson, and Williams (1984) found that seventh-grade learners make poor instructional choices when encountering complex instructional material or lacking prior knowledge. Ross and Rakow (1981) reported that college students in an introductory sociology class who were given instructional control, but no guidance, also made poor instructional choices. Pollock and Sullivan (1990) found that seventh-grade science students receiving required practice items had higher posttest scores than students allowed control over the amount of practice they received.

Hicken et al. (1992), postulated that one reason for the mixed achievement results in studies of learner versus program control relates to the differing nature of the instructional programs and learner-control options in the studies. In some studies, learners have had the option to add instruction to a relatively "lean" instructional program that contains only a basic amount of instruction, thereby lengthening the program and providing themselves with more instruction. In such cases, learner control might be expected to be more effective than simply working through the basic lean program under program control. In other studies, learner control has involved the option for learners to bypass instruction in a relatively "full" instructional program that contains a more

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comprehensive amount of instruction and practice, thereby shortening the program and providing themselves with less instruction. In these cases, learner control may not increase the effectiveness of the full program and could conceivably decrease it. That is, learner control may have differential effects depending on whether exercising the control enables learners to lengthen a basic instructional program or to shorten a more complete one.

A series of studies (Hannafin & Sullivan, 1995; Hannafin and Sullivan, 1996; Hicken et al., 1992; Igoe, 1993) has been conducted to investigate the effects of learner control in full and lean instructional programs. Collectively, these studies indicate that learner control over the amount of instruction in full and lean programs mitigates the achievement advantage that would normally be expected to favor the full program over the lean one. A significant achievement advantage for the full program over the lean one was obtained in only one of these four studies (Hannafin & Sullivan, 1995). Subjects under learner control in the full programs typically chose to bypass a relatively small amount of the instruction in their program version, while those in the lean programs normally chose to add less than half of the optional instruction available to them, thereby reducing the difference in the amount of instruction that would have been received by the full and lean groups under program control.

The option-selection pattern noted in the studies above involving learner control in both full and lean versions of an instructional program reflects a general tendency for learners to follow the default version of the program. That is, learners in a full version of a program tend to bypass a relatively low percentage of optional screens, and those in a lean version tend to add a relatively low percentage of optional screens. A similar pattern has also been observed by other researchers in studies including only a single learner-control

option, to add instruction or to bypass it. Generally, learners who have an option to bypass instruction bypass only about 20 percent of the optional elements available to them (Hannafin & Sullivan, 1995; Hicken et al., 1992; Lopez & Harper, 1989; Pollock & Sullivan, 1990). Learners who have the option to add instruction typically select 30 to 40 percent of the additional available elements (Carrier, Davidson, & Williams, 1985; Carrier & Williams, 1988; Hannafin & Sullivan, 1996; Kinzie et al., 1988). An exception to this latter pattern may occur in cases where learners are strongly motivated to do well, such as when the learner-controlled program consists of important course content that may have a significant influence on the subject's course grade. Igoe (1993) found that subjects in the lean version of an instructional program under such a condition chose to add 70 percent of the additional options available to them.

Learner time in program also varies across full and lean programs, sometimes in a way that is not consistent with the variation in the total number of screens viewed. Tennyson (1980) reported that subjects who received advisement in an instructional program spent more time and chose more options than subjects given control over the amount and sequence of elements in the program. Yet Kinzie and Sullivan (1989) and Kinzie, Sullivan, and Berdel (1988) found that learner-control subjects, despite bypassing review sections of an instructional program, spent a similar amount of overall time in program to subjects who were required to see the review. Interestingly, Schnackenberg, Sullivan, Leader, and Jones (1996) found that college students who used a full version of an instructional program, containing 242 screens with no learner-control option, did not spend significantly more time in program than subjects who used a lean version of the same program containing only 158 screens, presumably because the subjects in the lean program compensated for their

fewer screens by spending more time per screen in the program. Hicken et al. (1992), also found that students in the lean version of their program spent significantly more time per screen in the program than those in the full version, suggesting that these students were compensating for the lesser amount of basic instruction.

Another factor that may influence the effectiveness of various versions of computer-assisted instructional programs is student ability. Ross and Rakow (1981), Tennyson and Rothen (1977), and Goetzfried and Hannafin (1985) found that lower-ability students benefit more from program control than from learner control. Hativa (1988) reported that lower-ability subjects spent less time on task in a learner-control treatment than higher-ability subjects. Hannafin and Sullivan (1995) found that higher-ability students in a learner-controlled lean treatment chose to add optional elements of the program in 43% of the cases, whereas lower-ability learners chose to add optional elements in only 19% of the cases. Thus, lower-ability students may choose to avail themselves of fewer options than higher-ability students in learner-control programs, and therefore they may not perform as well under learner control as under program control.

Although learner control studies have yielded mixed results on learner achievement, results related to student attitudes and motivation have been consistently favorable. Kinzie and Sullivan (1989) found that high school students in a learner-controlled treatment chose to return to that type of program more often than students in a program-controlled treatment. Morrison, Ross, and Baldwin (1992) reported that sixth-grade students allowed to choose the amount and context of practice problems had more positive attitudes than those who were not. Igoe (1993) found that college students given leanPlus and

fullMinus versions of a learner-controlled program reported positive attitudes toward the learner-control feature in both versions.

The purpose of the present study was to investigate the effects of learner control and program control in full and lean computer-assisted instructional programs on the achievement of higher-ability and lower-ability university students. Four versions (program-control lean and full and learner-control lean and full) of a computer-assisted instructional program were used as the instructional materials for the study. The program was designed in the Macintosh HyperCard format. Previous research (Igoe, 1993) indicates that subjects in the course involved in this study are strongly motivated to perform well in the instructional program and to receive a good grade.

The following research questions were investigated:

1. Did university students achieve better under program control than under learner control in a computer-assisted instructional program?
2. Did students perform better in a full instructional program than in a lean one?
3. Did the availability of learner control affect student performance differentially in full and lean programs?
4. Did higher-ability and lower-ability students perform differently from one another under full and lean programs?
5. How does option use differ between higher-ability and lower-ability students under learner control in full and lean programs?

Questions related to learner attitudes and time on task under the different experimental treatments were also investigated. Time on task was examined with respect to total time by treatment and mean time per screen.

CHAPTER II

METHOD

Subjects

Participants in the study were 202 undergraduate education majors enrolled in their first semester of a professional teacher preparation program. All participants were registered for EDP 301, *Learning and Motivation*, during the Fall 1996 semester at Arizona State University.

Materials

The instructional materials were designed to teach content from a required textbook, Teaching for Competence (Sullivan & Higgins, 1983), for a course in which all students were enrolled. Three chapters from the text (Worthwhile Objectives, Effective Instruction, Assessment) were adapted into a computer-assisted program in the Macintosh HyperCard format for the study. The three chapters contained a total of 13 learning objectives. Instructions for using the program were included as part of the introduction to the program.

The program was developed in four versions that represented the four different treatment conditions. The elements of instruction other than practice (information, examples, reviews, and summaries) were identical in all versions of the program. Each of the 13 objectives was taught through a number of screens which present the instruction, practice and feedback, summaries, and reviews. Nine objectives required selected responses in a multiple-choice format and four required constructed responses. Practice items consisted of multiple-choice questions with two-to-four response choices for the nine selected-response objectives and of constructed-response items for the four constructed-response objectives. The program tracked each subject's progress by recording each response choice on a screen-by-screen basis.

Program-control subjects advanced through the program by using a mouse and selecting a button titled "Continue" to go to the next screen. Subjects in the two program-control versions (lean and full) were required to respond to all screens in their version. The program-control full version contained 174 information screens and 66 practice-with-feedback screens (six multiple-choice practice items for each of the nine selected-response objectives and three constructed-response practice items for each of the four constructed-response objectives). The program-control lean version contained the same 174 information screens but only 22 practice-with-feedback screens (two multiple-choice practice items for the selected-response objectives and one constructed-response practice item for the constructed-response objectives). Thus, there were a total of 240 screens (174 information screens and 66 practice-with-feedback screens) in the full program-control version of the program and 196 screens (174 information screens and 22 practice-with-feedback screens) in the lean program-control version.

In the learner-control treatments, the first two practice-with-feedback items for "selected-response objectives" and the first one practice-with-feedback item for "constructed-response objectives" were part of the basic program. That is, all learners under both full and lean learner-control conditions completed these items. The remaining four practice-with-feedback items for each selected-response objective and two practice-with-feedback items for each constructed-response objective were optional items under control of the learner.

In the full version of the learner-control program, a learner began the practice for an objective by completing the two basic practice-with-feedback items (one basic item for constructed-response objectives) for that objective. The learner then pushed the "Continue" button to forward the program to more

practice-with-feedback items for the objective (two more items if it was selected response, one more if constructed) or the "No More Practice" button to bypass additional practice on the objective. If the learner chose to continue at this first choice point, she/he was given the same option again ("Continue" or "No More Practice") after completing the item(s) from the initial choice to continue. Thus, learners had a maximum of two choice points per objective, and at their option they may have completed two, four, or six practice-with-feedback items for each selected-response objective or one, two, or three items per constructed-response objective.

The lean version of the learner-control program differed from the full one in the manner in which students chose to add practice or to move on to the next objective. As in the full program, a student began practice-with-feedback for an objective by completing the two basic practice-with-feedback items (one for constructed-response objectives) for that objective. The student was then given the option of pushing the "Continue" button, which was essentially the default option in the lean program, or the "More Practice" button. The "Continue" button moved the student to the next objective without further practice-with-feedback on the current one, whereas the "More Practice" button provided two more practice-with-feedback items (one for constructed-response items) on the current objective. If a student selected the "More Practice" option at the first choice point, she/he was given the same option ("Continue" or "More Practice") again after completing the item(s) from the first choice. Thus, similar to subjects in the full version, learners in the lean one had a maximum of two choice points per objective, and at their option they may have completed two, four, or six practice-with-feedback items for each selected-response objective or one, two, or three items per constructed-response objective. The difference is that in the full

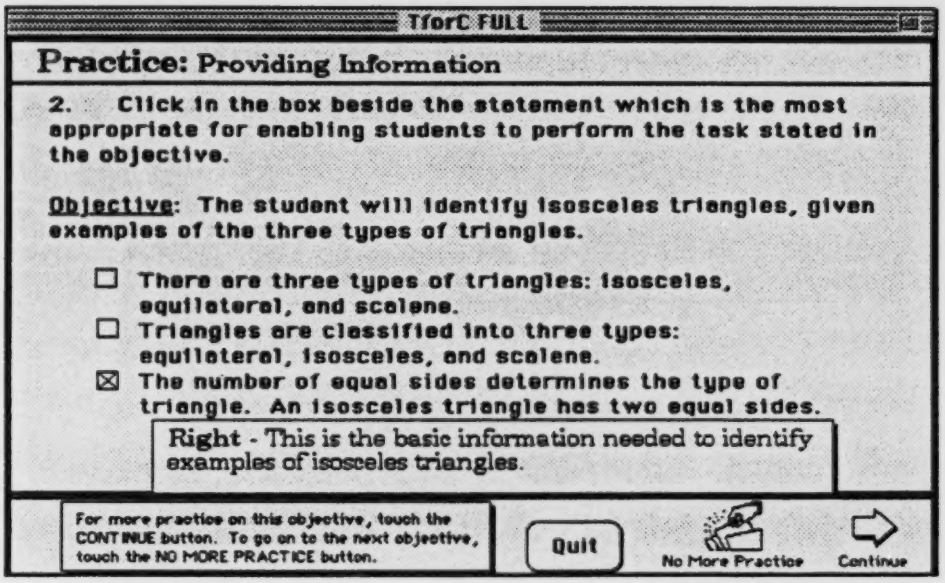
program the "Continue" choice moved the learner to additional practice-with-feedback items, whereas in the lean program the "Continue" choice moved the learner to the next objective.

A sample option-choice screen for both the full and lean learner-control modes is shown in Figure 1 on the next page. A copy of the full version in program-control form is contained in Appendix A.

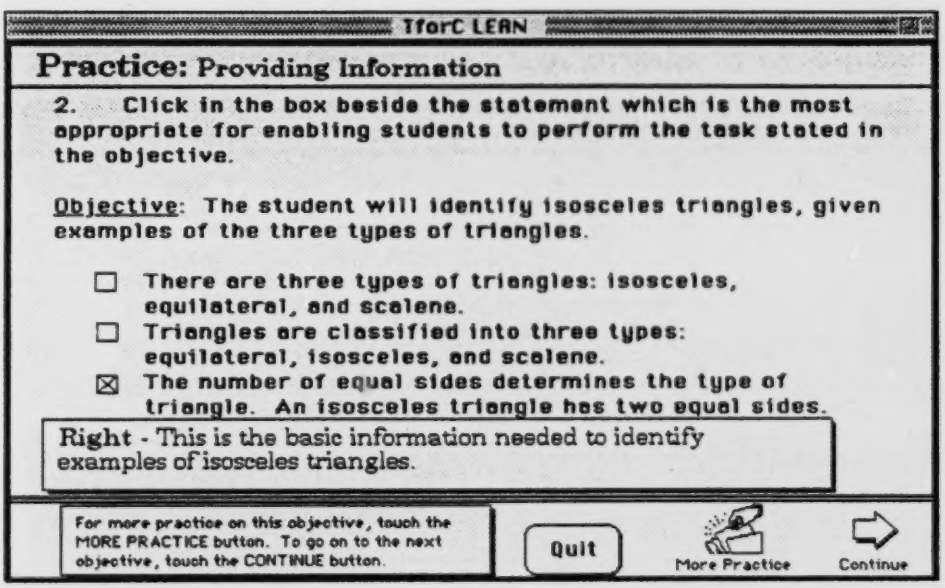
Procedures

Prior to assigning subjects to treatments, Scholastic Aptitude Test (SAT) and American College Testing Assessment (ACT) scores were obtained for 178 subjects. The SAT and ACT scores were then converted to z-scores in order to establish equivalence across the two sets of scores. Subjects with a z-score at or below 0.00 were classified as lower-ability, and those with a z-score above 0.00 were designated as higher-ability. The remaining 24 subjects were classified as higher-ability or lower-ability using grade point averages (GPA). Their median GPA was 3.40. Subjects with scores at or below 3.40 were classified as lower-ability, and those with scores above 3.40 were designated as higher-ability. All subjects were then randomly assigned to one of the four program versions within higher-ability and lower-ability groups.

Each subject was given an individual program disk with his or her assigned version of the program. Instruction sheets with directions for using the available computer facilities on the university campus were included with the disks. Subjects were given a two-week period without class meetings to complete the program. At the end of this period they reported back to their regular class session. The experimenter, several teaching assistants, and the course instructor were available to answer questions about the program.


TforC FULL
Practice: Providing Information
2. Click in the box beside the statement which is the most appropriate for enabling students to perform the task stated in the objective.
Objective: The student will identify isosceles triangles, given examples of the three types of triangles.
☐ There are three types of triangles: isosceles, equilateral, and scalene.
☐ Triangles are classified into three types: equilateral, isosceles, and scalene.
☒ The number of equal sides determines the type of triangle. An isosceles triangle has two equal sides.
Right - This is the basic information needed to identify examples of isosceles triangles.
For more practice on this objective, touch the CONTINUE button. To go on to the next objective, touch the NO MORE PRACTICE button.
Quit
No More Practice
Continue

Full


TforC LEAN
Practice: Providing Information
2. Click in the box beside the statement which is the most appropriate for enabling students to perform the task stated in the objective.
Objective: The student will identify isosceles triangles, given examples of the three types of triangles.
☐ There are three types of triangles: isosceles, equilateral, and scalene.
☐ Triangles are classified into three types: equilateral, isosceles, and scalene.
☒ The number of equal sides determines the type of triangle. An isosceles triangle has two equal sides.
Right - This is the basic information needed to identify examples of isosceles triangles.
For more practice on this objective, touch the MORE PRACTICE button. To go on to the next objective, touch the CONTINUE button.
Quit
More Practice
Continue

Lean

Figure 1. Sample option-choice screens for full and lean learner control modes.

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A paper-and-pencil posttest, described in the criterion measures section, was administered in the first class session after the two-week instructional period. Program disks were also collected at this time.

Criterion Measures

The paper-and-pencil posttest consisted of 36 multiple-choice items and eight two-point constructed-response items covering the 13 objectives in the instructional program. The multiple-choice items were scored either one or zero and the constructed-response items were scored either two, one, or zero, according to a scoring key developed by the experimenter. Thus, the maximum possible score on the criterion test was 52. The test items were different items from the practice items, but were in the same item form as the practice items for each objective. The Kuder-Richardson posttest reliability for the selected-response portion of the test, calculated using the entire sample in this study, was .78. A copy of the posttest is contained in Appendix B.

A thirteen-item attitude questionnaire assessed subjects' satisfaction with the material, their perceived effort, their desire for more information, their continuing motivation and their confidence in their posttest performance. The attitude questionnaire, a five-choice Likert-type questionnaire, was administered on-line immediately after students completed the instructional program. A copy of the attitude questionnaire is contained in Appendix C.

Design and Data Analysis

The experimental design was a 2 (full or lean program) x 2 (learner control mode) x 2 (higher-ability vs. lower-ability) posttest-only design with random assignment of subjects to treatments within higher-ability and lower-ability groups. Analysis of variance (ANOVA) was used to analyze the data for achievement, time in program, and for time per screen. Attitude questionnaire

data were analyzed using a multivariate analysis of variance (MANOVA), followed by a univariate analysis for each questionnaire item. Option-use data were analyzed using ANOVA.

The data on time were not collected in a manner that permitted routine identification of time spent on each type of screen (e.g. informational screens, basic practice screens, optional practice screens) in the program. However, analysis of option-use and time data revealed that this type of time-per-screen data would be useful in analyzing en route time patterns across higher-ability and lower-ability students. A data-extraction program is currently being written to obtain more detailed information regarding time per type of screen for higher-ability and lower-ability subjects. It is anticipated that this information will provide a clearer understanding of observed time-in-program and time-per-screen differences among higher-ability and lower-ability subjects.

CHAPTER III

RESULTS

Results are discussed below by achievement, option use, time in program, time per screen, and student attitudes.

Achievement

Means and standard deviations for the posttest scores are shown in Table 1. The ANOVA summary table for these data is included in Table 2. The mean posttest scores for type of control were 35.60 for learner control and 34.66 for program control, a nonsignificant difference. The mean posttest scores by program mode were 37.17 for subjects who received the full version of the program and 33.95 for subjects who received the lean version. This difference was statistically significant, F (1, 194) = 10.31, $p < .001$. Scores for ability were 38.84 for higher-ability learners and 31.41 for lower-ability learners, also a statistically significant difference, F (1, 194) = 53.83, $p < .001$. There were no significant interactions.

Multivariate analysis of variance (MANOVA) revealed that the nonsignificant effect for type of control and the significant effects for both program mode and ability were consistent across both selected-response and constructed-response items. The overall mean score across all subjects on the 52-item posttest was 35.52 items correct (68 percent).

Option Use

Tables 3 and 4 contain the mean number and percentage of optional screens viewed by learner-control subjects and the ANOVA summary table. Learner-control subjects using the full version of the program viewed 30.13 of the 44 optional screens (68%) available to them, while those using the lean version of the program viewed 15.28 of the 44 optional screens (35%). ANOVA revealed

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Table 1

Mean Overall Posttest Scores by Program Mode, Type of Control, and Ability

Program Mode	Learner Control		Program Control		Totals
	Lower-Ability	Higher-Ability	Lower-Ability	Higher-Ability	
Lean					
M	31.05	38.39	28.26	36.30	33.95
SD	(7.40)	(6.83)	(8.45)	(6.45)	(8.19)
Full					
M	34.08	38.86	32.25	41.82	37.17
SD	(9.83)	(5.52)	(7.12)	(5.12)	(7.87)
Total					
M	32.63	38.62	30.11	38.91	35.52
SD	(8.79)	(6.16)	(8.02)	(6.44)	(8.17)

Note: Cell sizes ranged from 20 to 30. Total score possible = 52.

Main Effect Means:

Type of Control	Program Mode	Ability
Learner = 35.60	Lean = 33.95	Lower = 31.41
Program = 34.66	Full = 37.17	Higher = 38.84

Table 2

ANOVA Summary Table for Posttest Performance

Source of Variance	df	SS	MS	F	p
Type of Control	1	43.69	43.69	.86	.36
Program Mode	1	524.69	524.69	10.31	.001
Ability	1	2740.66	2740.66	53.83	.001
Ability by Control	1	93.24	93.24	1.83	.18
Ability by Mode	1	3.41	3.41	.067	.14
Control by Mode	1	111.73	111.73	2.19	.80
Ability by Control by Mode	1	52.12	52.12	1.02	.31
Error	194	9877.45	50.92		
Total	201	13424.30			

Table 3

Means, Standard Deviations, and Percentages of Optional Screens Viewed Under Learner Control

Program Mode	Lower Ability	Higher Ability	Total
Lean			
Mean	11.36	18.36	15.28
SD	11.97	14.12	13.55
Percent	26	42	35
Full			
Mean	28.20	31.79	30.13
SD	14.44	14.18	14.28
Percent	64	72	68
Total			
Mean	20.15	25.07	22.85
SD	15.68	15.57	15.74
Percent	46	57	52

Note: Cell sizes ranged from 22 to 28. Total number of optional screens = 44. Standard deviations are calculated on the number of optional screens viewed, not the percentages.

Table 4

ANOVA Summary Table for Optional Screens Viewed Under Learner Control

Source of Variance	df	SS	MS	F	p
Program Mode	1	5780.33	5780.334	30.42	.001
Ability	1	704.79	704.79	3.71	.06
Ability by Mode	1	73.60	73.60	.39	.54
Error	98	18620.20	190.00		
Total	101	25012.80			

that this difference was statistically significant, F (1, 98) = 30.42, $p < .001$. Higher-ability learner-control subjects viewed 25.07 (57%) of the optional screens, and their lower-ability counterparts viewed 20.15 (46%), a difference that did not reach statistical significance, F (1, 98) = 3.71, $p = .06$. There were no significant interactions for option use.

Option use by learner-control subjects was also analyzed to obtain more precise data on the numbers of students under learner control who generally chose to follow the default version of their program in selecting options. Twenty-five of the 51 students (49%) in the full learner-control version, but only seven of the 47 (15%) in the lean learner-control version, chose to view more than 80% of the 44 optional practice screens. Fourteen of these students in the full version and four in the lean version chose to view all 44 optional practice screens. In contrast, 16 students in the lean version, but only three in the full version, chose to view less than 20% of the optional practice screens.

Time in Program

Table 5 shows the mean number of minutes subjects spent in the program and Table 6 contains the ANOVA summary table for these data. The mean times for type of control were 97.14 minutes for learner control and 102.70 minutes for program control, a nonsignificant difference. The mean times by program mode were 108.05 minutes for subjects who received the full version of the program and 92.05 minutes for those who received the lean version. This difference was statistically significant, F (1, 194) = 5.57, $p < .05$. Mean times for ability were 108.09 minutes for lower-ability learners and 93.44 minutes for higher-ability learners, a statistically significant difference, F (1, 194) = 4.69, $p < .05$, indicating that lower-ability learners spent more time in the program than higher-ability learners.

Table 5

Mean Overall Time in Program (in Minutes) by Program Mode, Mode of Control, and Ability

	Learner Control		Program Control		
Program Mode	Lower-Ability	Higher-Ability	Lower-Ability	Higher-Ability	Totals
Lean					
M	114.68	88.95	83.20	85.14	92.05
SD	(79.08)	(35.99)	(36.18)	(61.41)	(55.94)
Full					
M	94.25	94.03	146.09	106.69	108.05
SD	(32.82)	(41.45)	(60.58)	(52.01)	(50.54)
Total					
M	104.02	91.49	112.45	95.35	99.89
SD	(59.79)	(38.55)	(57.91)	(57.68)	(53.83)

Note: Cell sizes ranged from 20 to 30.

Main Effect Means:

Type of Control	Program Mode	Ability
Learner = 97.14	Lean = 92.05	Lower = 108.09
Program = 102.70	Full = 108.05	Higher = 93.44

Table 6

ANOVA Summary Table for Time in Program (in Minutes)

Source of Variance	df	SS	MS	F	p
Type of Control	1	2648.13	2648.13	1.00	.32
Program Mode	1	14801.80	14801.80	5.57	.02
Ability	1	12467.60	12467.60	4.69	.03
Ability by Control	1	411.30	411.30	.16	.69
Ability by Mode	1	777.13	777.13	.29	.59
Control by Mode	1	30879.20	30879.20	11.62	.001
Ability by Control by Mode	1	13861.00	13861.00	5.22	.02
Error	194	515667.00	2658.08		
Total	201	582412.00			

ANOVA also yielded a significant two-way interaction (program mode by type of control) for time in program, E (1, 194) = 11.62, $p < .001$. This interaction is diagrammed in Figure 2. It reflects the fact that subjects under program control spent much more time in the full version of the program than in the lean one (M=123.45 minutes in full and 84.30 minutes in lean), whereas subjects under learner control spent more time in the lean version than in the full one (M=100.27 minutes for lean and 94.13 minutes for full).

Finally, ANOVA yielded a three-way interaction (program mode by type of control by ability) for time. It can be seen in Table 5 and in the diagram in Figure 3 that three of the four ability-by-control groups (higher-ability program control, higher-ability learner control, and lower-ability program control) spent more time in the full version of the program than in the lean one. However, the fourth ability-by-control group (lower-ability learner control) reversed this pattern by spending much more time (114.68 minutes to 94.25 minutes) in the lean program than in the full one. This reversal in which one of the four ability-by-control groups spent more time in the lean version of the program than in the full one is responsible for the three-way interaction.

The average time for completion of the program across all subjects was 99.89 minutes, or approximately one hour and 40 minutes.

Time per Screen

Means and standard deviations for the number of seconds subjects spent per screen are shown in Table 7. The ANOVA summary table for these data is included in Table 8. The mean times per screen for type of control were 26.49 seconds for learner control and 28.18 seconds for program control, a nonsignificant difference. The mean times per screen by program mode were 27.71 seconds for subjects who received the full version of the program and

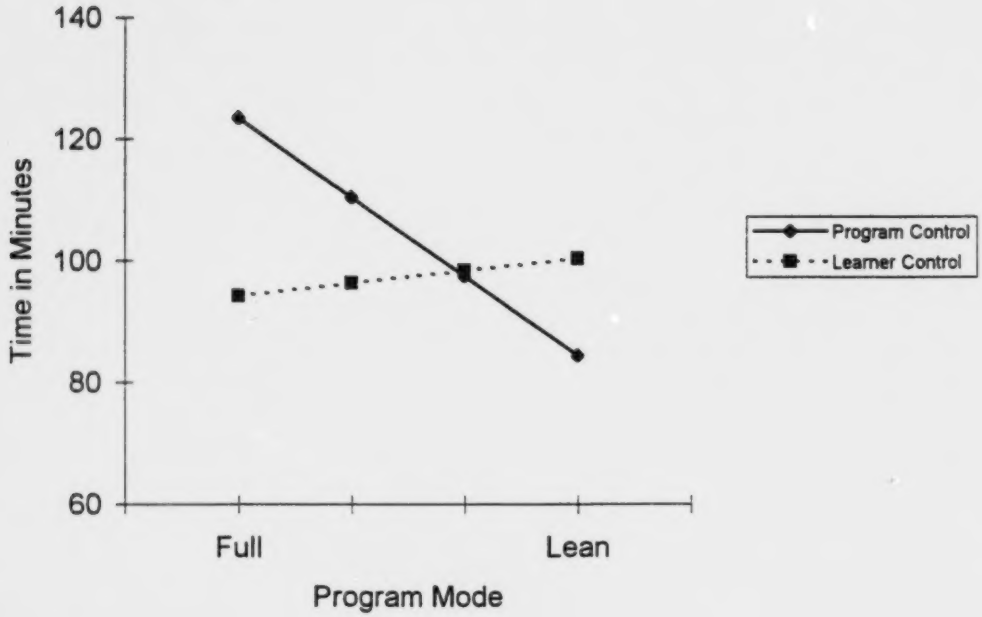

Figure 2. Program mode by type of control interaction for time in program.

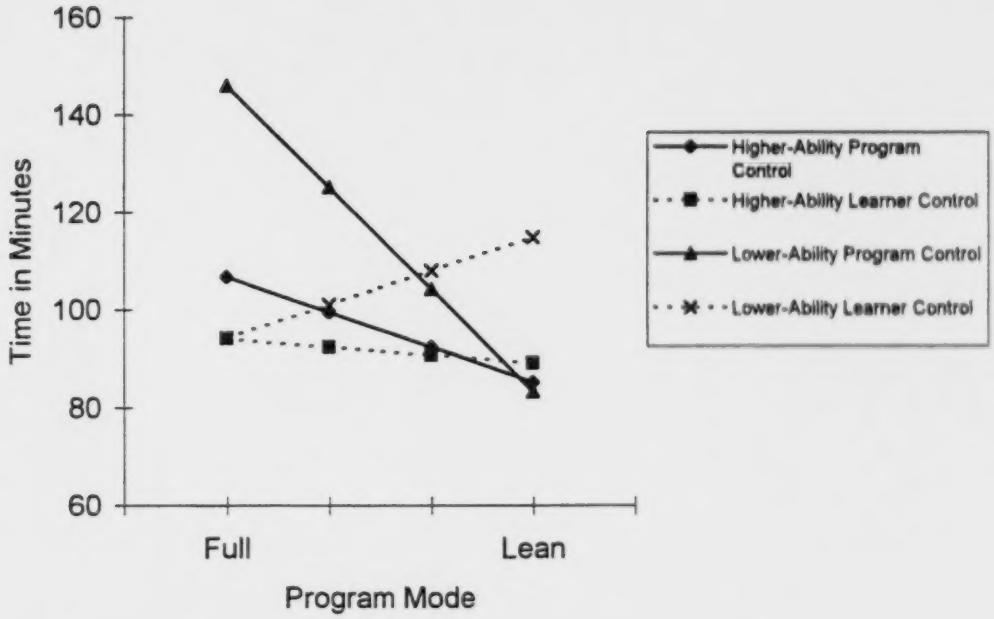

Figure 3. Program mode by type of control by ability interaction for time in program.

Table 7

Mean Overall Time per Screen (in Seconds) by Program Mode, Mode of Control, and Ability

Program Mode	Learner Control		Program Control		Totals
	Lower-Ability	Higher-Ability	Lower-Ability	Higher-Ability	
Lean					
M	32.66	24.65	25.47	26.06	26.96
SD	(19.99)	(8.99)	(11.07)	(18.80)	(15.49)
Full					
M	25.31	24.48	36.52	26.67	27.71
SD	(9.11)	(9.91)	(15.15)	(13.00)	(12.51)
Total					
M	28.83	24.56	30.61	26.35	27.33
SD	(15.58)	(9.38)	(14.11)	(16.17)	(14.07)

Note: Cell sizes ranged from 20 to 30.

Main Effect Means:

Type of Control	Program Mode	Ability
Learner = 26.49	Lean = 26.96	Lower = 29.69
Program = 28.18	Full = 27.71	Higher = 25.46

Table 8

ANOVA Summary Table for Time per Screen (in Seconds)

Source of Variance	df	SS	MS	F	p
Type of Control	1	180.57	180.57	.95	.33
Program Mode	1	53.19	53.19	.28	.58
Ability	1	1016.80	1016.80	5.36	.02
Ability by Control	1	.51	.51	.00	.96
Ability by Mode	1	33.04	33.04	.17	.68
Control by Mode	1	1140.72	1140.72	6.01	.02
Ability by Control by Mode	1	963.34	963.34	5.07	.03
Error	194	36836.50	189.88		
Total	201	39818.00			

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26.96 seconds for those who received the lean version, also a nonsignificant difference. Mean times per screen for ability were 25.46 seconds for higher-ability learners and 29.69 seconds for lower-ability learners, a statistically significant difference, F (1, 194) = 5.36, $p < .05$, indicating that lower-ability learners spent significantly more time per screen in the program than higher-ability learners.

ANOVA yielded a significant two-way interaction for program mode by type of control for time per screen, F (1, 194) = 6.01, $p < .05$. This interaction, which is illustrated in Figure 4, reflects the fact that in the full program, subjects spent much more time per screen under program control than under learner control (M=30.86 seconds under program control and 24.86 seconds under learner control), whereas in the lean program subjects spent more time per screen under learner control than under program control (M=28.17 seconds for learner control and 25.81 seconds for program control).

ANOVA also yielded a three-way interaction (program mode by type of control by ability) for time per screen. This interaction is illustrated in Figure 5. It reflects the fact that lower-ability students spent more time per screen in the lean version than in the full one under learner control (M=32.66 seconds for lean and 25.31 seconds for full), whereas they spent more time per screen in the full version than in the lean one under program control (M=36.52 seconds for full and 25.47 seconds for lean). Higher-ability students, on the other hand, had similar times per screen across the lean and full versions both under learner control and under program control.

The average time per screen in the program across all subjects was 27.33 seconds.

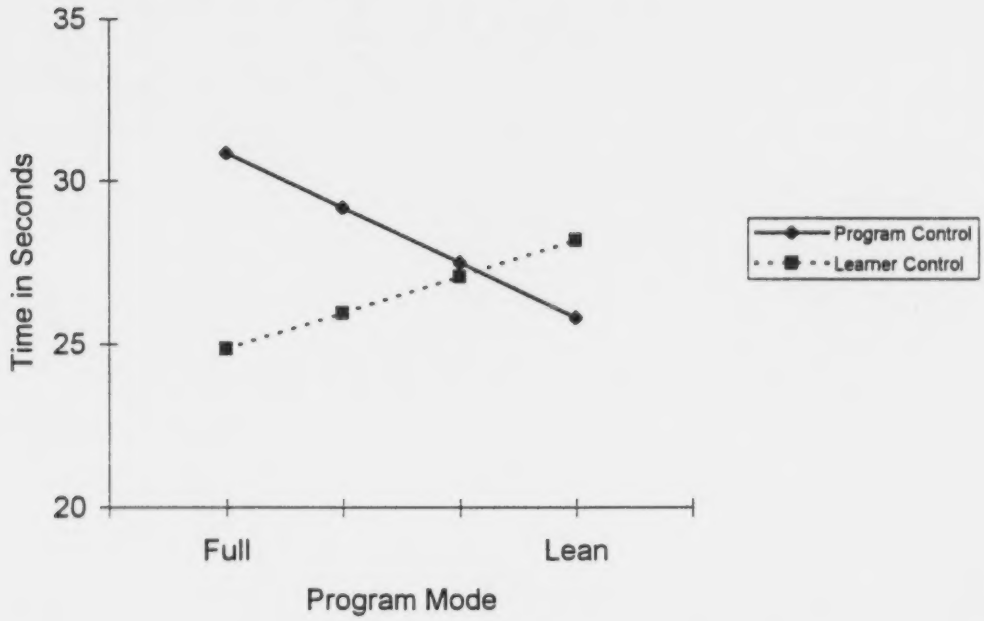

Figure 4. Program mode by type of control interaction for time per screen.

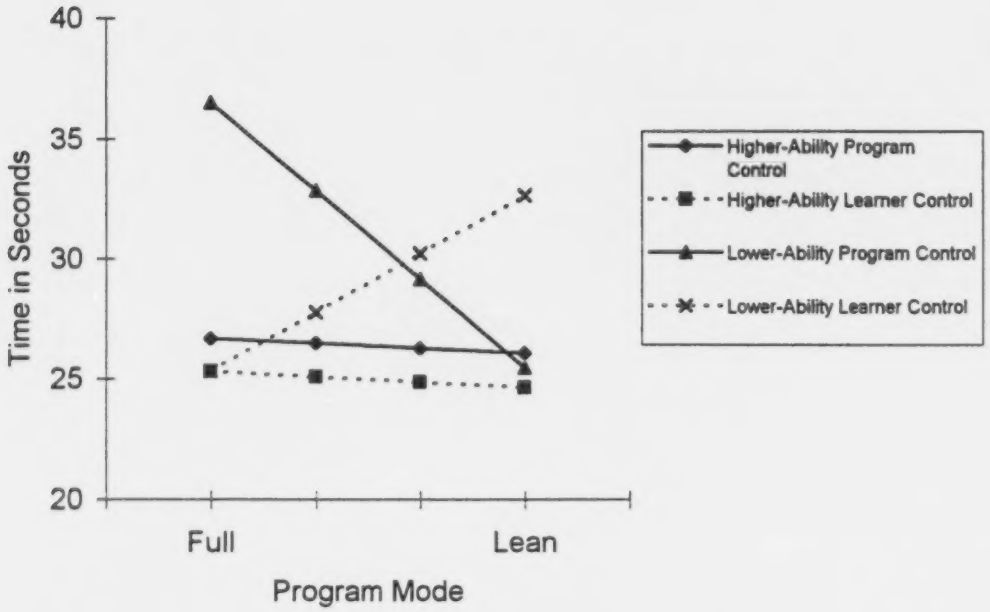

Figure 5. Program mode by type of control by ability interaction for time per screen.

Attitudes

Responses to 11 Likert-type items on the attitude questionnaire, which was scored on a 5 (most positive) to 1 (least positive) basis, are shown in Table 9. Significant MANOVA effects were found for type of control, F (11, 184) = 7.93, $p<.001$, and program mode, F (11, 184) = 2.25, $p<.01$, but not for ability . Follow-up univariate tests were conducted for type of control and program mode to determine differences on an item-by-item basis.

Table 9 reveals that subjects in the learner control mode had more positive attitude scores than those in the program control mode on nine of the 11 Likert-type questionnaire items, and significantly more positive scores on six of these items. Learner control subjects agreed significantly more strongly than program control subjects that they would tell other students to use the program if they wanted to learn more about Competency-Based Instruction, liked the program, had control over what they studied in the program, had enough opportunities to practice answering questions, were able to adjust the program to get the amount of practice they needed, and thought that this was a good way to learn content.

Table 9 also indicates that subjects in the full mode (M=3.83) and those in the lean mode (M=3.79) had similar overall attitudes toward the program. The only significant difference between the two modes revealed that subjects in the full mode had significantly more positive attitudes than those in the lean mode on the item "I had enough opportunities to practice answering questions in the program."

A significant interaction was found on two of the items for type of control by program mode, F (11, 184) = 2.74, $p < .01$. One interaction occurred on item nine, "I had enough opportunities to practice answering questions in the

Table 9

Attitude Scores by Type of Control and Program Mode

# Item	Type of Control: Learner Control	Type of Control: Program Control	p	Program Mode: Full	Program Mode: Lean	p
1. The program was easy.	3.95	3.89	ns	3.89	3.95	ns
2. I would like to learn more about Competency-Based Instruction.	3.97	4.04	ns	3.96	4.05	ns
3. I tried hard to do well in the program.	4.43	4.26	ns	4.29	4.40	ns
4. I would tell other students to use this program if they wanted to learn about Competency-Based Instruction.	4.10	3.72	.01	4.04	3.79	ns
5. Overall, I liked the program.	4.09	3.77	.01	4.05	3.82	ns
6. I like this program better in computer form than in book form.	3.88	3.84	ns	3.89	3.84	ns
7. If I had to work on another computer program, I would prefer one that provided a lot of instruction and practice.	4.00	4.04	ns	4.07	3.97	ns
8. I had control over what I studied in this program.	3.41	3.03	.05	3.22	3.22	ns
**9. I had enough opportunities to practice answering questions in the program.	3.98	3.29	.001	3.89	3.40	.001
10. This was a good way to learn the content.	3.99	3.63	.01	3.88	3.75	ns
*11. I was able to adjust the program to get the amount of practice I needed.	3.66	2.23	.001	2.93	2.97	ns
Overall means	4.00	3.62		3.83	3.79	

Note: All items measured on a five-point scale from 5 to 1 (Strongly Agree to Strongly Disagree) -- thus, higher scores are more positive. ns = p> .05.

* Significant program mode by mode of control interaction at p<.05.
** Significant program mode by mode of control interaction at p<.001.

program." Subjects under learner control had a slightly higher mean score in the lean version (M = 4.06) than in the full version (M = 3.90), whereas subjects under program control had a much lower score in the lean version (M = 2.77) than in the full one (M = 3.87). The other interaction occurred on item 11, "I was able to adjust the program to get the amount of practice I needed." For this item, subjects under learner control had a higher mean score in the lean version (M = 3.90) than in the full one (M = 3.42), whereas under program control subjects had a higher mean score in the full version (M = 2.38), than in the lean one (M = 2.09).

Subjects showed distinct preferences in their responses to item 13 and item 14. On item 13, 71 percent of the subjects (143 of 202) selected "about right" as their answer in response to the statement, "The program was: way too long, a little long, about right, a little too short, way too short." For item 14, "In the future, what kind of learning activities would you like to do?", 51 percent of the subjects (102 of 202) indicated that they would prefer to learn Competency-Based Instruction without computers in preference to the other three choices: Competency-Based Instruction with computers (6%), another subject with computers (17%), another subject without computers (26%). Collectively, these responses to item 14 reveal that 77% of the subjects indicated a preference to learn either Competency-Based Instruction or another subject without a computer and only 23% indicated a preference to learn them on a computer.

CHAPTER IV

DISCUSSION

This study examined the effects of mode of control (program control or learner control), program mode (full or lean) and ability (higher-ability or lower-ability) on the achievement, option use, time in program, and attitudes of university undergraduate students. Subjects in the full program mode scored significantly higher on the posttest than those in the lean program mode, and higher-ability students scored significantly higher than lower-ability ones. Learner-control subjects viewed nearly twice as many optional screens in the full program (68%) as in the lean one (35%). Subjects also spent significantly more time in the full version of the program than in the lean version, and higher-ability learners spent significantly less time per screen in the program than lower-ability learners.

Student Achievement

The significantly higher achievement for students in the full version of the program over those in the lean version is most likely due to the greater amount of practice for those in the full version. Under program control, students received 44 more practice screens in the full version than in the lean one as a function of the design of the study. Under learner control, where the design permitted subjects to adjust or control the number of practice screens they received, students chose approximately 15 more optional practice screens (30.13 to 15.28) in the full version than in the lean one. Thus, across the two control modes, students averaged nearly 30 more practice screens in the full versions of the program ($\underline{M}$ = 36.71) than in the lean versions ($\underline{M}$ = 7.42).

This greater amount of practice for students in the full program could account not only for their higher achievement, but also for their greater amount of time in program.

The lack of a significant difference for mode of control may also be related to the amounts of practice that students received under the program-control and learner-control modes. Students under program control were assigned either to the full version of the program, where they received the basic program plus all 44 additional practice screens, or to the lean version, where they received the basic program with no additional practice screens. Thus, students under program control received an average of 22 practice screens (44 plus zero screens divided by 2) in addition to the basic program, or 50% of the potential additional screens. Interestingly, students under learner control received a very similar number of additional (or optional) practice screens to those under program control. The learner-control students chose an average of 22.85 optional practice screens, or 52% of the additional practice screens available to them, across the full and lean versions of the program. On average, then, the program-control and learner-control subjects varied by less than one screen (22.00 screens for program control, 22.85 for learner control) in the amount of practice they received in addition to the basic program. It is not surprising, therefore, that there was not a significant difference in achievement, nor in time in program, between subjects in these two control modes.

The finding that higher-ability students scored significantly better on the posttest than their lower-ability counterparts was expected, of course. Higher-ability students would be expected to outperform lower-ability ones on the basis of ability alone. In addition, higher-ability students may have had an added advantage in that those under learner control chose an average of nearly five

optional screens more (25.07 to 20.13) than lower-ability students under learner control, a difference that approached (p = .06) but did not reach statistical significance.

Option Use

The finding that subjects under learner control chose to view significantly more optional screens – nearly twice as many in this study – in the full program than in the lean one is consistent with results from several previous learner-control studies using different experimental materials (Hannafin & Sullivan, 1995, 1996; Hicken, Sullivan, & Klein, 1992). Collectively, these results indicate that many students tend to follow the default version of their assigned program in selecting options. That is, students in the full learner-control version tend to accept, rather than skip, the optional instruction that is the default route in their program version. Students in the lean learner-control version tend to accept, rather than add to, the basic instructional program that is the default route in their version. Consequently, students under learner control view many more optional screens in the full version than in the lean one.

That higher-ability students chose to view more optional screens than lower-ability students under learner control calls into question, at least for the lower-ability students, the point of view that individual learners know their own instructional needs and are best able to adjust the amount of instruction to meet these needs (Mager, 1964; Merrill, 1975, 1980; Kinzie, Sullivan, & Berdel, 1988). If advocates of this point of view use the term "instructional needs" to mean what a learner needs to improve learning from given instruction, it seems reasonable that they might expect lower-ability learners to select at least as many optional practice screens as higher-ability learners to meet these needs. That was not

the case in the present study nor in other learner-control studies by Carrier, Davidson, and Williams (1985), Gray (1987), and Hannafin and Sullivan (1995).

The argument that individual learners should be given control over their instruction because they know their own instructional needs assumes that learners make the decision to choose more or less instruction on the basis of these needs. That may often be the case. However, the present results in combination with earlier studies (Carrier, Davidson, Higson, & Williams, 1984; Hannafin & Sullivan, 1995, 1996) suggest that the length of the default version of a program may often influence learner choices about adding or by-passing instruction as strongly as the learner's instructional needs. That is, learners may allow the nature of the program itself to exert considerable control over their choices even when they have personal control over these choices.

The idea that learners make instructional choices to meet their own needs also ascribes a sense of purpose to each learner choice as the learner works through a program. However, it is not clear how purposeful learners are when they choose to follow the default route of a program. As Hannafin and Sullivan (1995) note, the program's default path may offer a form of guidance to learners that is similar to the advisement feature recommended by Tennyson (Tennyson,1980; Tennyson & Buttrey, 1980). Many learners may tend to trust their default version and may make a conscious decision to respond in close accordance with it. Others may simply defer their choices in a much more passive and less purposeful way and simply let the default version make the choices for them.

Time in Program

Even though higher-ability students scored higher and chose marginally more optional screens than lower-ability students, lower-ability students spent

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significantly more time in the program than their higher-ability counterparts. Most likely, lower-ability learners are slower readers and also take longer to respond to practice items, thus accounting for their greater time in the program. Conversely, their greater time in program that results from their slower progress may be a reason that they do not chose more optional screens. It seems likely that subjects who spend more time per screen in a program will choose to complete fewer screens in order to avoid taking an excessive amount of time to complete the program.

A two-way interaction for program mode by type of control reflected the fact that subjects in the full program spent more time under program control than under learner control, whereas subjects in the lean program spent less time under program control than under learner control. This pattern was predictable because program-control subjects in the full version automatically received all of the available practice screens and therefore would be expected to spend more time in the program than learner-control subjects, who could choose to skip practice screens and therefore reduce their time in program. In contrast, program-control subjects in the lean version would be expected to spend less time in the program than learner-control subjects because the former group automatically received no optional practice screens and could not add them, whereas the learner-control subjects could choose to add screens and thereby lengthen their time in program.

While the two-way program mode by type of control interaction for time in program was not unexpected, one relationship reflected in this interaction is surprising. That is the fact that subjects under learner control spent more time in the lean version of the program ($\underline{M}$=100.27 minutes) than in the full one ($\underline{M}$=94.13 minutes). This occurred despite the fact that learner-control subjects

in the lean version viewed only 15.28 (35%) of the 44 optional practice screens, while those in the full version viewed 30.13 (68%) of the options. There does not seem to be a plausible explanation why learner-control subjects who viewed nearly 15 fewer practice screens would nonetheless spend more time in program than their counterparts who viewed the greater number of screens.

The three-way interaction (program mode by type of control by ability) for time in program indicates the source of the time-in-program data that resulted in learner-control subjects spending more time in the lean version than in the full one, but it does little to provide a logical explanation of why learner-control students would spend more time in the lean program. Their greater overall time in the lean program was due to the fact that lower-ability students spent more than 20 minutes longer (114.68 to 94.25) in this program than in the full one under learner control. In contrast, higher-ability students under learner control spent about five minutes less (88.95 to 94.03) in the lean program than in the full one, and both higher-ability and lower-ability students spent considerably less time in the lean program than in the full one under program control. Thus, the contrast in the time pattern of the lower-ability students under learner control across the lean and full program versions with the pattern of the other three ability-by-control groups is responsible not only for the three-way interaction, but also for the two-way program mode by type of control interaction.

Lower-ability students spent 20 minutes more in the lean version than in the full one under learner control even though they chose to view nearly 17 fewer optional screens (11.36 or 26% of available options in lean, 28.20 or 64% in full) in the lean program. This phenomenon of spending a much greater amount of time on fewer screens does not occur for other ability-by-treatment combinations and is very difficult to explain. It suggests that lower-ability

students spend much more time on optional screens that they add to a lean program, thus varying from the default route, than on optional screens that they receive automatically by following the default route in a full program. It seems plausible that, when subjects choose to view only 26% of the optional screens, they consider these screens to be more important than when they receive 64% under a process that may be more automatic. However, even if this were the case, it seems very unlikely that it would cause the greater time in program and time per screen for lower-ability learner-control students in the lean version over their counterparts in the full version.

Time per Screen

The time-per-screen analysis yielded similar results to the time-in-program analysis for type of control and for ability, but a somewhat different result for program mode. As with time in program, there was no significant difference in time per screen between subjects under learner and program control, and lower-ability subjects spent significantly more time per screen than higher-ability subjects. However, the significant difference for time in program indicating that subjects spent more time in the full program mode than in the lean one did not occur for time per screen. The lack of a significant difference for time per screen by program mode, even though such a difference was obtained for time in program, is due to the fact that subjects in the full program viewed many more screens than those in the lean program.

The same two-way (program mode by type of control) and three-way (program mode by type of control by ability) interactions were obtained for time per screen as for time in program. The two-way interaction occurred because learners spent more time per screen in the full program than in the lean one under program control, but more time per screen in the lean program than in the

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full one under learner control. A logical explanation for the program-control results is that there were 44 more practice screens in the full program than in the lean one under program control, and these practice screens are likely to take more time per screen to complete than the informational screens in both program versions. This would result in more time per screen in the full version under program control, of course. However, as noted earlier the time-in-program data for learner control revealed that lower-ability learners spent much more time in the lean learner-control version than in the full one even though they completed fewer screens in this version. This resulted in greater time per screen in the lean version under learner control. The three-way interaction resulted from the contrast of lower-ability students spending much more time per screen in the lean version under learner control but much less time in the lean version under program control, whereas higher-ability students spent similar amounts of time in the lean and full versions under both control conditions.

Student Attitudes

The attitude data related to type of control indicate that learners were sensitive to the difference in amount of control available to them in the learner-control and program-control versions, and that they preferred the learner-control approach. Subjects under learner control had significantly more positive attitudes than those under program control on all three survey items dealing with amount of control or practice: "I had control over what I studied...", "I had enough opportunities to practice...", and "I was able to adjust the program to get the amount of practice I needed." Similarly, learner-control subjects had significantly more positive attitudes than program-control subjects on the three items that dealt specifically or generally with how well they liked the program: "Overall, I liked the program", "I would tell other students to use this program...",

and "This was a good way to learn...." The more favorable overall attitudes toward learner control are consistent with results obtained by other researchers (Hannafin & Sullivan, 1995; Kinzie & Sullivan, 1989; Morrison, Ross, & Baldwin, 1992).

Whereas the attitude data for type of control revealed a rather strong overall difference favoring learner control, the data for program mode indicated that learner attitudes were quite similar toward the full and lean versions of the program. The only significant difference by program mode again reflected subjects' awareness of the difference in available practice between program versions, as subjects in the full version agreed more strongly than those in the lean one that they had enough opportunities to practice answering questions.

Significant interactions for type of control by program mode occurred on the items "I had enough opportunities to practice answering questions in the program", and "I was able to adjust the program to get the amount of practice I needed." Subjects in the full version agreed more strongly with both these statements under program control, whereas those in the lean version agreed more strongly with both under learner control. Similar explanations may account for both these findings. Program-control subjects in the full version would be expected to indicate that they had enough opportunities to practice to a greater extent than those in the lean version. Similarly, although neither group could adjust their program, the full-version subjects may have responded more favorably to the "adjust the program to get the amount of practice I needed" question because they felt more strongly that they got the amount of practice they needed. Conversely, learner-control subjects in the lean version may well have perceived a greater need for their option to add practice in order to supplement their lean program than their counterparts in the full program

perceived for the option to reduce practice. This could account for the more favorable ratings by learner-control subjects in the lean program than by those in the full one on the two items for which interactions were obtained.

Implications and Further Research

One implication of the present results for the design of computer-based instruction is that a program that makes a relatively high amount of practice available to learners as the default route is likely to be more effective than one that makes a relatively low amount available as the default route. This implication is consistent with findings from several other researchers (Freitag & Sullivan, 1995; Hannafin & Sullivan, 1995; Schnackenberg, Sullivan, Leader, & Jones,1996). The present results also suggest that the high amount of practice, or fuller version of a program, may be as effective in a learner-control mode as in a program-control one, although additional research may be advisable to determine the consistency of this finding. Learner control produced comparable achievement results to program control in the full program version in the study, and it has the advantage of yielding more favorable student attitudes. However, it is somewhat more costly to develop a learner-control version than a program control one because of the additional programming time that is required, and this is a factor that should be taken into account in making a decision about the type of control to build into an instructional program.

The idea that a fuller version of an instructional program that includes more practice is likely to be more effective than a leaner version now seems to be well established. Additional research seems justified on the type of control, and perhaps on the amount of learner control, that is most effective in instructional programs. Research on the thought processes that learners use to make learner control decisions may also yield information that is helpful to

instructional designers. Further investigations in these research areas have the potential to contribute to the identification of design features that will yield effective computer-delivered instructional programs.

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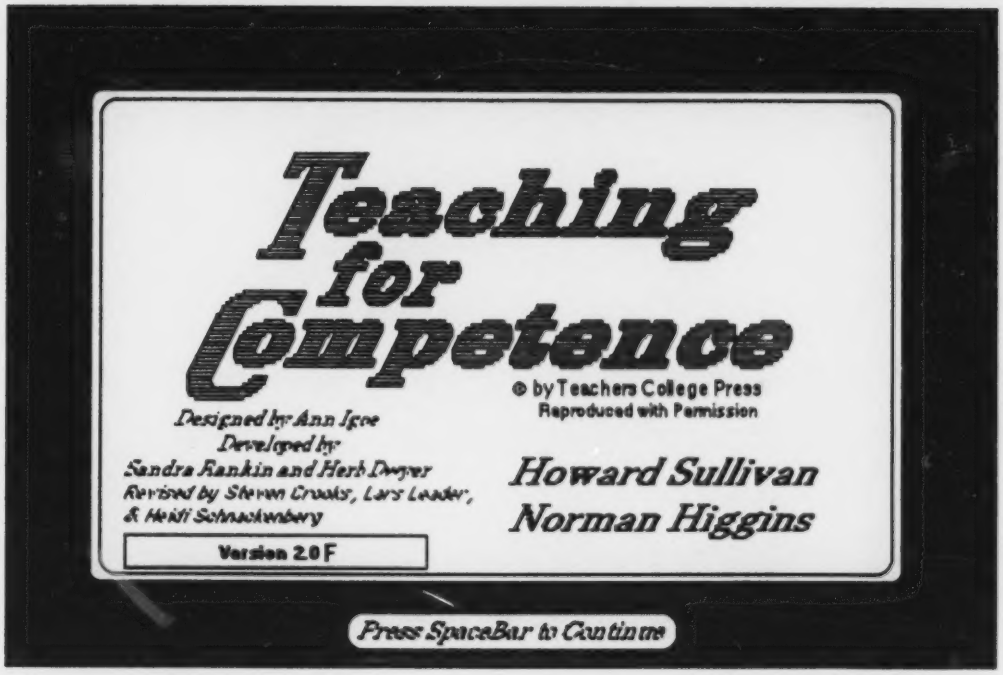
APPENDIX A

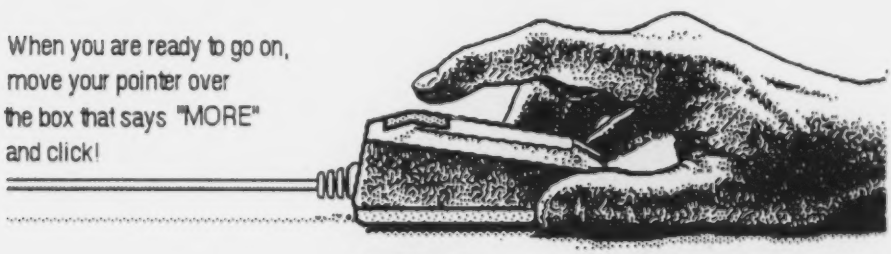
INSTRUCTIONAL PROGRAM: TEACHING FOR COMPETENCE



Getting Started:

To go through this program you will need to know how to point and click a mouse. Slide the mouse (like the one shown below) across the table. Notice the little hand with its finger pointing moving around on the screen. This hand is called a pointer. When you move the pointer over certain objects and press or click the button on the mouse, you are talking to the computer. Try clicking on this eye. Move the pointer over the eye and then press the mouse button.

When you are ready to go on, move your pointer over the box that says "MORE" and click!



MORE Quit

Getting Started:

To move through this program you will use the mouse to see new material. You can advance through the program by clicking on available selection buttons like the ones at the bottom of this screen.

Buttons which are appropriate to each screen will appear in the same position each time as they are needed.

Clicking on the CONTINUE arrow will show you the main program.

Now, let's move on! Click on the CONTINUE button.

Quit

Continue

Getting Started:

You will also be able to answer questions by using the mouse.

Sometimes you will see a group of possible answers with boxes next to each of them. To select an answer, use the mouse to move the pointer over one of the boxes and click. If you want to change your answer, simply click another box. Try it now.

☐ This is easy!

☐ I can do this!

Remember: click an available button when you want to go on.

Quit

Getting Started:

Sometimes you will be asked to type in an answer. To do this, use the mouse to move the pointer to the beginning of the line and click. After you click, you will see a flashing cursor. Type in your answer and press RETURN. If you make a mistake, use the backspace key to erase your mistake and retype before you press RETURN. Try it now!

Type in the name of your section leader followed by a "Return".

Section Leader: [ ]

Remember: click an available button when you want to go on.

Quit

Introduction: Teaching for Competence

Teaching for Competence will show you how you can:

- decide what your students should learn
- teach it well
- check to see if the students have learned it

This teaching approach is called competency-based instruction because it is based on the idea of teaching specific skills, or competencies, to your students.

Remember: click an available button when you want to go on.

Quit

Continue

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Introduction: Teaching for Competence

You will learn about competency-based instruction by studying the instruction presented on this computer disk:

Lesson 1. WORTHWHILE OBJECTIVES--deciding what your students will learn (part 1).

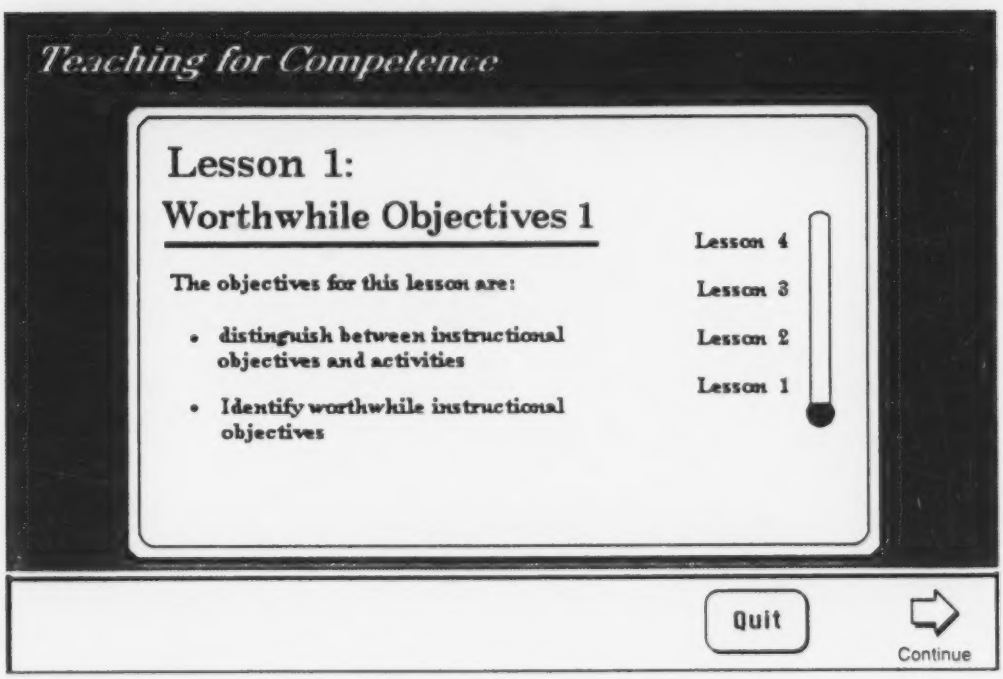
Lesson 2. WORTHWHILE OBJECTIVES--deciding what your students will learn (part 2).

Lesson 3. EFFECTIVE INSTRUCTION--teaching the content well.

Lesson 4. ASSESSMENT--checking to see how well your students learned.

Click an available button when you want to go on.

Quit Continue



Instruction: Worthwhile Objectives

WORTHWHILE OBJECTIVES

Deciding what your students should learn is the first major step in competency-based instruction. Your goal is to determine the skills and attitudes that you want your students to acquire.

These skills and attitudes are often called *instructional objectives*.

Quit

Continue

Instruction: Worthwhile Objectives

Good instructional objectives are the foundation for competency-based instruction. This section of Teaching for Competence will show you how to recognize and write good instructional objectives.

At the end of this section you should be able to:

- **distinguish between instructional objectives and activities**
- **identify well-written instructional objectives**
- **write instructional objectives.**

Quit

Continue

Instruction: Worthwhile Objectives

It is easy to confuse objectives and activities when you are working with instruction. Objectives represent the ends of instruction and activities represent the means to those ends.

An *objective* describes a skill or attitude that students will be expected to possess after instruction.

An *activity* is a learning experience in which students participate for the purpose of attaining an objective.

Quit Continue

Instruction: Worthwhile Objectives

The difference between an activity and an objective is illustrated below:

ACTIVITY: *The student will view a filmstrip about famous Indian legends and their significance in an Indian culture.*

This is an experience students might participate in for the purpose of learning about Indian legends.

OBJECTIVE: *The student will tell at least three well-known Indian legends and describe the significance of each in an Indian culture.*

This is a skill that the teacher might want students to acquire from a unit on Indians.

Quit Continue

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Instruction: Worthwhile Objectives

Another example of the difference between an activity and an objective is:

ACTIVITY: *The student will find pictures of different types of natural regions (desert, grassland, tundra, etc.).*

OBJECTIVE: *The student will name the natural regions represented in a set of pictures (desert, grassland, tundra, etc).*

Quit Continue

Practice: Worthwhile Objectives

The next few items will allow you to practice identifying instructional objectives and activities. Click the CONTINUE button to see a practice item.

Quit Continue

Practice: Worthwhile Objectives

1. Click in the box beside the statement which is an instructional objective.

☐ The student will solve long-division problems.

☐ The student will practice multiplication tables.

Quit

Practice: Worthwhile Objectives

2. Click in the box beside the statement which is an instructional activity.

☐ The student will take a field trip to the art museum.

☐ The student will sound out and read new words.

Quit

Practice: Worthwhile Objectives

3. Click in the box beside the statement which is an instructional activity.

☐ The student will discuss in class the reasons for World War I.

☐ The student will name four Shakespearean plays and write a brief plot summary of each.

Quit

Practice: Worthwhile Objectives

4. Click in the box beside the statement which is an instructional objective.

☐ The student will write a good business letter.

☐ The student will read Chapter 3 in the science book and underline the important things to remember.

Quit

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Practice: Worthwhile Objectives

5. Click in the box beside the statement which is an instructional objective.

☐ The student will write an original ballad.

☐ The student will visit a community service agency on a class field trip.

Quit

Practice: Worthwhile Objectives

6. Click in the box beside the statement which is an instructional activity.

☐ The student will rehearse a speech using a prepared copy of the speech.

☐ The student will name the primary colors when shown examples of each color.

• Last practice item for this section .

Quit

Summary: Worthwhile Objectives

Click the CONTINUE button to see a short summary of what you have just studied about the differences between instructional objectives and activities.

Quit

Continue

Summary: Worthwhile Objectives

Remember, objectives are statements of skills that you want students to acquire from instruction and to continue to possess over a period of time.

In contrast, activities are the learning experiences students participate in for the purpose of acquiring skills.

Quit

Continue

Instruction: Identifying Worthwhile

IDENTIFYING WORTHWHILE OBJECTIVES

Deciding what skills are important for students to acquire is a major responsibility for every teacher. As teachers, we should examine each potential objective for our courses to determine whether it is worthwhile.

Quit Continue

Instruction: Identifying Worthwhile

A good way to examine an objective is to answer the following questions about the skill stated in the objective.

- Is this a skill that the students will actually use later in life?
- If not, is this skill required in order to acquire another useful skill?

If the answer to either of the above questions is "yes", then the objective can be considered to be worthwhile.

Quit Continue

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Instruction: Identifying Worthwhile

In many instructional situations, the instruction stops short of dealing with the most important objective for the content being taught. Students memorize information but do not apply it appropriately. This may occur, for example, when students learn a definition but do not apply it to a number of examples.

Quit

Instruction: Identifying Worthwhile

This example illustrates a memorization objective:

OBJECTIVE: The student will define each of the eight parts of speech (noun, verb, pronoun, adverb, adjective, preposition, conjunction, and interjection.)

This objective merely requires students to give definitions of terms -- definitions that can be memorized with little or no understanding.

This is considered to be a worthwhile objective because knowing this information is important in order to learn other things.

Quit

Instruction: Identifying Worthwhile

This example illustrates an application objective:

OBJECTIVE: The student will identify examples of each part of speech in written passages.

This objective requires students to identify examples of the content being taught, a skill that they are likely to use in life and one that demonstrates an understanding of the content.

Quit

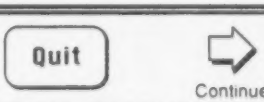
Instruction: Identifying Worthwhile

Here is another example of a memory objective and an application objective.

MEMORY: The student will write the formula for computing the area of a triangle.

APPLICATION: The student will compute the area of a triangle whose base and height are given.

Quit



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Practice: Identifying Worthwhile

The next few items will allow you to practice recognizing worthwhile objectives. Click on CONTINUE to see a practice item.

Quit

Continue

Practice: Identifying Worthwhile

7. Look at the pair of objectives below from a unit on phonics for beginning readers. Choose the more worthwhile objective of the two. Remember to ask if this skill will be used later in life or if it is necessary to learn something else.

☐ The student will select pictures of objects that rhyme (for example, mark the objects that rhyme in pictures of a cat, dog, hat, and bat.)

☐ The student will sound out new words composed of letters whose sounds were learned earlier.

Quit

Practice: Identifying Worthwhile

8. Choose the more worthwhile objective of the two below from a primary-grade arithmetic unit on money.

☐ The student will describe how a clerk should make change for purchases of less than a dollar.

☐ The student will tell whether he or she receives the correct change for a dollar when making purchases of less than a dollar.

Quit

Practice: Identifying Worthwhile

9. Choose the more worthwhile objective of the two below.

☐ The student will name each example correctly when shown examples of isosceles, scalene, and equilateral triangles.

☐ The student will define each of the three types of triangles (isosceles, scalene, and equilateral).

Quit

Practice: Identifying Worthwhile

10. Choose the more worthwhile objective of the two below.

☐ The student will identify the illustration that best depicts the meaning of the passage, given any passage from the reading text and three illustrations related to the passage.

☐ Given any passage from the reading text, the student will describe the passage accurately in his or her own words.

Quit

Practice: Identifying Worthwhile

11. Choose the more worthwhile objective of the two below.

☐ The student will perform cardio-pulmonary resuscitation (CPR) on a mannequin.

☐ The student will describe the procedure for performing cardio-pulmonary resuscitation.

Quit

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Practice: Identifying Worthwhile

12. Choose the more worthwhile objective of the two below.

☐ The student will change a tire properly.

☐ The student will describe the correct procedure for changing a tire.

• *Last practice item in this section*

Quit

Summary: Identifying Worthwhile

Clicking CONTINUE will show you a short summary of what you have just studied about identifying worthwhile memory and application objectives.

Quit

Continue

Summary: Identifying Worthwhile Objectives

Both memory and application objectives can be considered to be worthwhile. Memory objectives are worthwhile because they are helpful or required in order to learn an application objective.

Application objectives are worthwhile because students are likely to use them in later life.

In planning instruction of this type, you should be sure to develop objectives that require students to perform the actual operations you want them to learn.

Quit

Continue

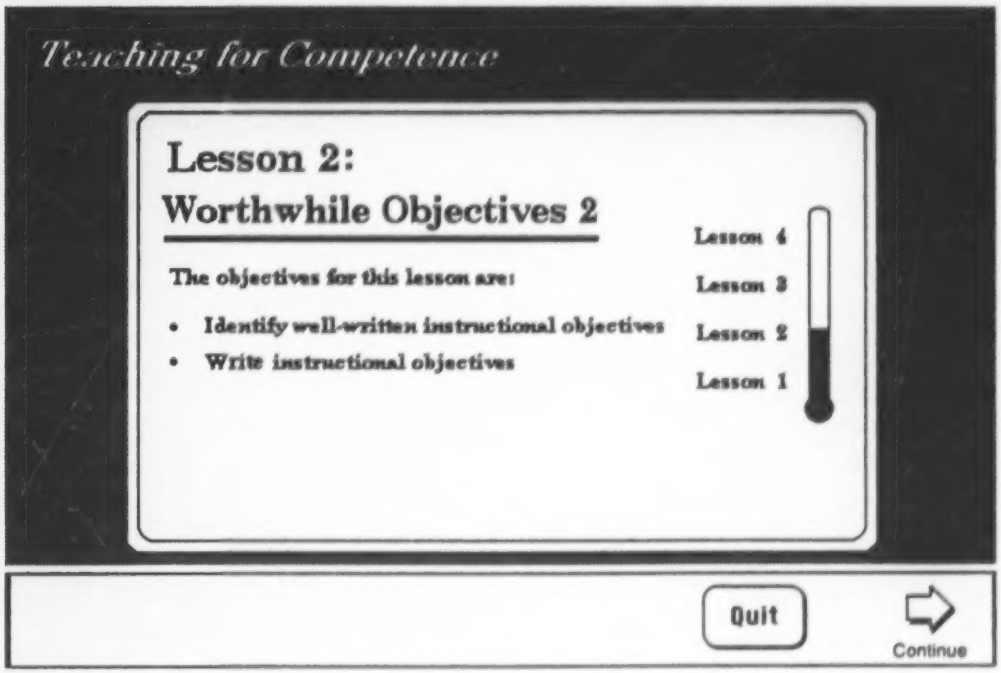
End of Lesson 1

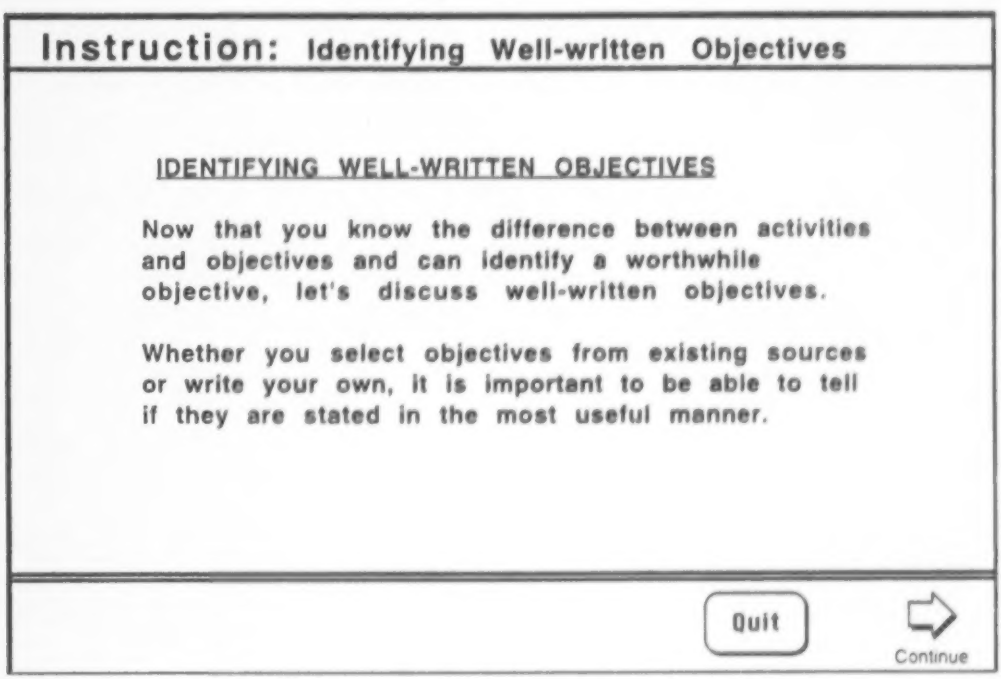
You have completed lesson 1.

Click on the Continue button to go to Lesson 2.

Quit

Continue


Teaching for Competence
Lesson 2:
Worthwhile Objectives 2
The objectives for this lesson are:
• Identify well-written instructional objectives
• Write instructional objectives
Lesson 4
Lesson 3
Lesson 2
Lesson 1
Quit
Continue


Instruction: Identifying Well-written Objectives
IDENTIFYING WELL-WRITTEN OBJECTIVES
Now that you know the difference between activities and objectives and can identify a worthwhile objective, let's discuss well-written objectives.
Whether you select objectives from existing sources or write your own, it is important to be able to tell if they are stated in the most useful manner.
Quit
Continue

Instruction: Identifying Well-written

Two parts of an instructional objective are especially important in deciding whether it is well-written:

1. Description of student performance, and
2. Description of conditions for assessing the performance.

In this section you will learn how to identify descriptions of student performance.

Quit

Continue

Instruction: Describing Student Performance

DESCRIBING STUDENT PERFORMANCE

It is very important to leave no doubt about the nature of the performance expected from students after instruction. For this reason, well-written objectives state what students will be able to do rather than what they will feel.

Quit

Continue

Instruction: Describing Student Performance

Objectives that describe what students will know or what they will feel are much less desirable than those that describe what students will do. Such objectives describe internal states or processes that, unlike performance, cannot be directly observed.

Quit

Instruction: Describing Student Performance

Using the right verb is the key to stating what students will be able to do.

Here are several examples of verbs used in instructional objectives that describe actual student performance (that is, what students will be able to do):

select, state, name, describe, write, build, or draw.

A well-written objective must contain this type of verb.

Quit

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Instruction: Describing Student Performance

Objectives that describe internal states or processes can also be identified by their verbs.

Examples of verbs used in such objectives include:

analyze, appreciate, understand, and value.

When you see a verb of this type in an objective, you can immediately classify the objective as not being well-written.

Quit

Continue

Summary: Describing Student Performance

The next item is a short summary of what you have just studied about describing observable student performances.

Click CONTINUE for the summary.

Quit

Continue

Summary: Describing Student Performance

A well-written objective must describe what the learner will be able to do -- an observable performance instead of an internal state or process.

Quit

Continue

Instruction: Describing Performance Conditions

DESCRIBING PERFORMANCE CONDITIONS

In addition to describing what students will be able to do, a well-written objective states what information or materials, if any, students will be given when they are assessed on the objective.

The information or materials given to the student are referred to as the performance conditions, or sometimes simply as the "givens."

Quit

Continue

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Instruction: Describing Performance Conditions

The given is underlined in the following example:

The student will identify statements of fact and statements of opinion in newspaper editorials.

The nature of the expected student performance would not be clear if the objective ended after the word "opinion" and the given materials (newspaper editorials) were not specified.

Quit

Continue

Instruction: Describing Performance Conditions

Here is another example with the given underlined:

Given the letters of the alphabet in printed form, the student will name each letter.

If the givens were not included, the student would only be required to say the letters of the alphabet from memory, rather than naming each letter in its printed form.

Quit

Continue

Instruction: Describing Performance Conditions

Whether a statement of givens is appropriate in your objective depends upon the particular objective.

If the students are to be given information or materials to use in performing the behavior called for in the objective, then the givens may be:

1. Necessary,
2. Dependent on your intent, or
3. Inappropriate

Quit

Continue

Instruction: Describing Performance Conditions

Here is an example of Givens necessary:

The student will identify nouns and verbs, given . . .

Givens are necessary to indicate what material will contain the nouns and verbs. This information is necessary in order to clearly communicate the nature of the expected student performance.

Quit

Continue

Instruction: Describing Performance Conditions

Here is an example of Givens dependent on the intent:

The student will name the four competition swimming strokes . . .

If you wanted the students to be able to say or write from memory the names of the four strokes, the objective is correct as stated.

However, if you wanted students to be able to name each stroke while seeing it performed, it would be necessary to add to the objective a statement of givens such as "given filmed examples of each stroke."

Quit Continue

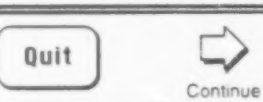
Instruction: Describing Performance Conditions

Here is an example of Givens inappropriate:

The student will describe at least three causes of the Civil War.

Givens are inappropriate for this objective because no special information or materials would be given to the student when assessing performance on this objective.

Objectives which include givens of an obvious nature -- given paper and pencil -- are inappropriate and not considered to be well-written.

Quit  Continue

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Summary: Describing Performance Conditions

The next item summarizes what you have just studied about appropriate givens (conditions) for well-written objectives.

Click CONTINUE to see the summary.

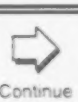
Quit

Continue

Summary: Describing Performance Conditions

Givens are appropriate when you need to identify material or information which is necessary to communicate the student performance. Obvious givens -- such as paper and pencil -- are not appropriate in an objective.

Quit



Continue

Instruction: Common Errors in "Givens"

COMMON ERRORS IN WRITING "GIVENS"

Two common errors in writing givens are:

1) to state instructional activities or events, and

2) to state the type of test item to be given.

Quit

Continue

Instruction: Common Errors in "Givens"

Here is an example of a stated instructional activity or event used in a statement of givens:

Given a lesson on levers, the student will name the three classes of levers.

This is not a well-written objective. The "given" states an instructional activity and not materials or information that will be given when performance is assessed.

Quit

Continue

Instruction: Common Errors in "Givens"

Here is an example of the type of test item used in a statement of givens:

> Given multiple-choice items on the characteristics of each class of levers, the student will correctly identify the characteristics of each class.

Objectives containing givens of this type are not considered to be well-written.

Quit

Continue

Summary: Common Errors in "Givens"

The next item is a short summary of what you have just studied about common errors in statements of givens.

Click CONTINUE for the summary.

Quit

Continue

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Summary: Common Errors in "Givens"

Statements of givens which state instructional activities or test items are not appropriate in an objective.

Quit

Continue

Instruction: Identifying Well-written Objectives

IDENTIFYING WELL-WRITTEN OBJECTIVES

You have seen that a well-written objective describes:

- an observable student performance, and
- performance conditions, or givens, during assessment when such a description is appropriate.

Quit

Continue

Practice: Identifying Well-written Objectives

The next few items will allow you to practice identifying well-written objectives.

Click CONTINUE to practice.

Quit

Practice: Identifying Well-written Objectives

1. Mark the objective which is well-written.

☐ The student will label the four parts of a flower.

☐ Given color photographs of well-known paintings by Picasso, Chagall, Miro, and Dali, the student will name the artist and the title of each painting.

Quit

Practice: Identifying Well-written Objectives

2. Mark the objective which is well-written.

☐ The student will describe from memory each of the four steps in the process of cell division.

☐ Given paper and pen, the student will write an original business letter in the format specified in class.

Quit

Practice: Identifying Well-written Objectives

3. Mark the objective which is well-written.

☐ The student will learn the importance of a balanced diet.

☐ The student will name the food group (milk, meat, vegetable-fruit, bread-cereal) to which each food in a given list of difficult-to-classify foods belongs.

Quit

Practice: Identifying Well-written Objectives

4. Mark the objective which is well-written.

☐ Given a lecture-demonstration on magnetism, the student will describe how an electromagnet works.

☐ The student will voluntarily participate in at least one school or community service activity during the school year.

Quit

Practice: Identifying Well-written Objectives

5. Mark the objective which is well-written.

☐ Given tools, the student will adjust the brakes on an American made automobile.

☐ The student will set the hands on a geared demonstration clock to the time specified by the teacher.

Quit

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Practice: Identifying Well-written Objectives

6. Mark the objective which is well-written.

☐ The student will describe from memory the differences between a square and a rectangle.

☐ The student will learn the characteristics of free enterprise as described in the class text.

• *Last practice item for this section.*

Quit

Summary: Identifying Well-written Objectives

The next item is a short summary of what you have just studied about identifying well-written objectives.

Click CONTINUE to see the summary.

Quit

Summary: Identifying Well-written Objectives

Remember, an acceptable objective tells *what a student will be able to do*--an observable student behavior.

It may include a statement of givens, if appropriate.

Quit

Instruction: Writing Instructional Objectives

WRITING INSTRUCTIONAL OBJECTIVES

You can get objectives for a course either by adopting existing objectives or by writing your own.

The easier, but often less satisfactory, way is to adopt objectives contained in materials such as course textbooks, local curriculum guides, and published sets of objectives.

Quit

Instruction: Writing Instructional Objectives

However, for many courses, a good source of prepared objectives may not be available or you may be unable to find satisfactory sources of existing objectives.

In such cases, it will be necessary to prepare your own objectives.

Quit

Continue

Instruction: Writing Instructional Objectives

There are advantages to preparing instructional objectives in written form, rather than merely thinking them through.

The most important advantage is that the objectives will then be available for reference when you are planning instructional activities and assessment.

Quit

Continue

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Instruction: Writing Instructional Objectives

To write your own instructional objectives, you must first decide:

1) what the instructional content (the concepts, principles, processes, and so forth) should be, and

2) what students should be able to do after learning the content.

Quit

Continue

Instruction: Writing Instructional Objectives

Once you know what the instructional content will be, you can determine instructional objectives by deciding what is important for students to be able to do--that is, the skills and attitudes they will be expected to acquire.

At this point you should consider whether each potential objective is worthwhile and what givens, if any, are appropriate during assessment.

Quit

Continue

Practice: Writing Instructional Objectives

The next few items will allow you to practice writing instructional objectives.

Click CONTINUE to practice.

Quit

Continue

Practice: Writing Instructional Objectives

For each practice item, you will be given a description of what you might want a student to learn.

You will be asked to type an objective based on the description. Be sure to use a verb that describes what the student will *do* and to state givens when appropriate.

Click on the CONTINUE button to begin the practice item.

Quit

Continue

Practice: Writing Instructional Objectives

7. Write an instructional objective for the situation described below.

You want your students to look at paragraphs and know which sentence is the topic sentence in each.

Type your objective in the box provided. Click the CONTINUE button when you are finished.

Quit

Practice: Writing Instructional Objectives

8. Write an instructional objective for the situation described below.

You want your students to be able to do problems such as the following:

29	12	77
+37	+53	+38

Type your objective in the box provided. Click the CONTINUE button when you are finished.

Quit

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Practice: Writing Instructional Objectives

9. Write an instructional objective for the situation described below.

The teacher wants students to know how much interest will have to be paid on a simple-interest loan when they are told the principal, rate, and time for the loan.

Type your objective in the box provided. Click the CONTINUE button when you are finished. • *Last practice item for this section.*

Quit

Continue

Summary: Writing Instructional Objectives

The next item is a short summary of what you just studied about writing instructional objectives.

Click CONTINUE to see the summary.

Quit

Continue

Summary: Writing Instructional Objectives

When you write worthwhile objectives, be sure to include an observable student performance and an appropriate statement of givens.

Quit

Continue

Review: Worthwhile Objectives

The next few items present a review of Lessons1 and 2, Worthwhile Objectives. Click on the CONTINUE button to see the review.

Quit

Continue

Review: Worthwhile Objectives

Review of What You've Learned

- Instructional objectives are skills or attitudes you want students to have.
- Worthwhile objectives are skills a student will use later in life or which are required in order to learn another skill.
- Instructional objectives contain performance verbs and appropriate givens, or conditions of assessment.

Quit

Continue

Review: Worthwhile Objectives

These are the skills you should have learned from this session:

- how to distinguish between instructional objectives and instructional activities
- how to identify worthwhile instructional objectives.
- how to identify well-written instructional objectives
- how to write good instructional objectives.

These skills will help you develop good instructional objectives for your students.

Quit

Continue

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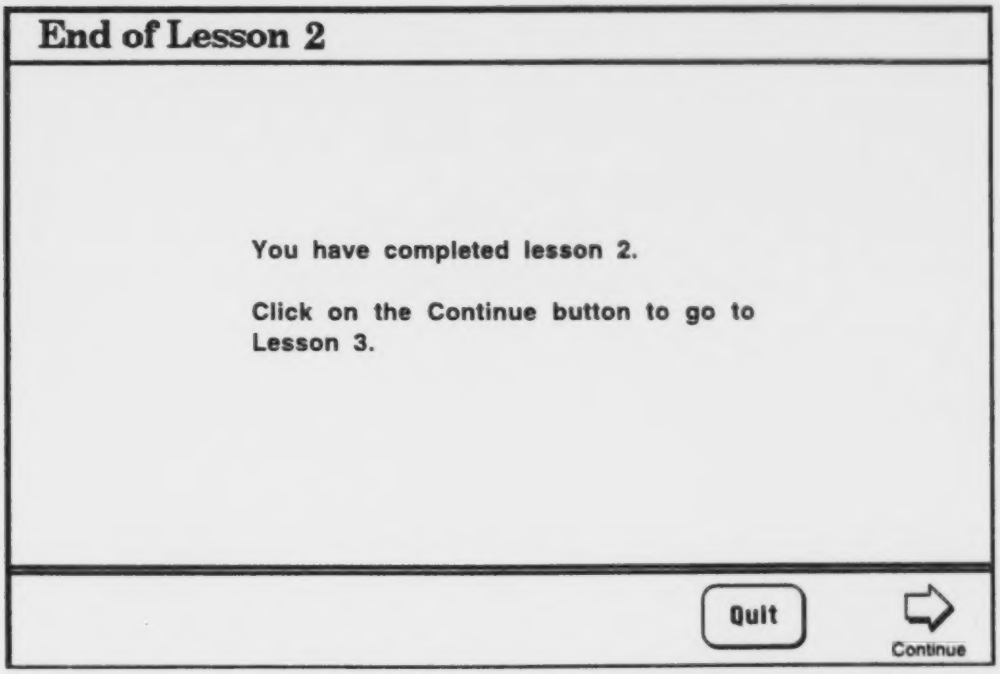
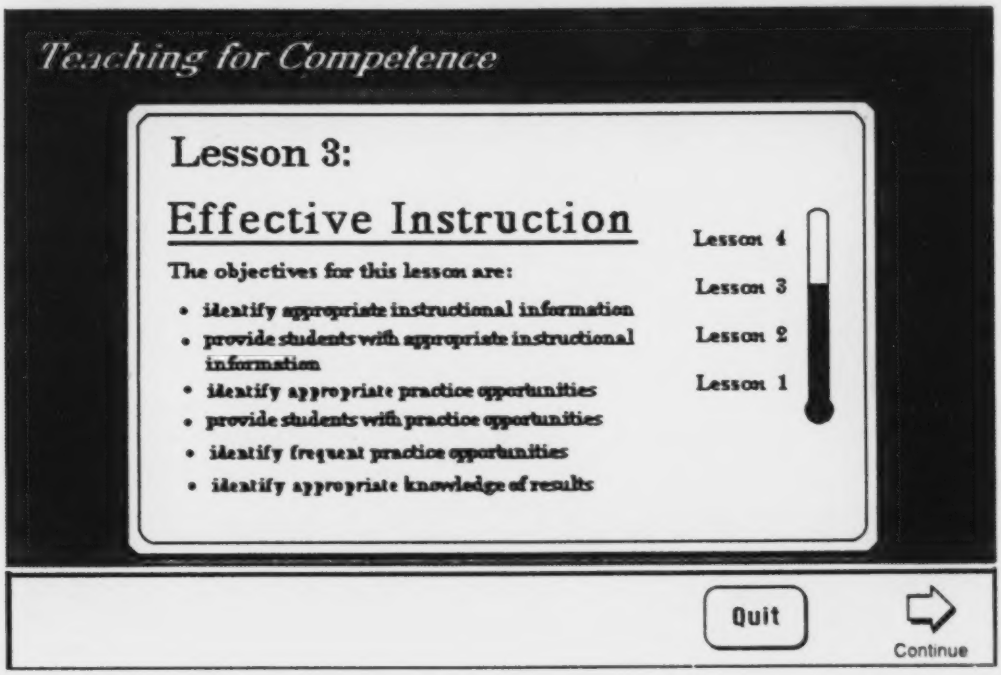

End of Lesson 2
You have completed lesson 2.
Click on the Continue button to go to Lesson 3.
Quit
Continue


Teaching for Competence
Lesson 3:
Effective Instruction
The objectives for this lesson are:
• identify appropriate instructional information
• provide students with appropriate instructional information
• identify appropriate practice opportunities
• provide students with practice opportunities
• identify frequent practice opportunities
• identify appropriate knowledge of results
Lesson 4
Lesson 3
Lesson 2
Lesson 1
Quit
Continue

Instruction: Effective Instruction

EFFECTIVE INSTRUCTION

Good instruction follows directly from your objectives. The purpose of competency-based instruction is to enable your students to acquire the skills and attitudes reflected in your objectives.

Effective instruction is composed of these elements:

- introducing the activity
- providing information
- providing practice
- providing knowledge of results
- reviewing the activity

Quit

Continue

Instruction: Introducing Learning Activities

INTRODUCING LEARNING ACTIVITIES

To introduce a learning activity you should do at least two things:

1. Communicate the objective to the students, and

2. Provide a motivator.

Quit

Continue

Instruction: Introducing Learning Activities

When you tell your students about an objective, use language that is easily understood by the students. If possible, use examples of the learning tasks, such as sample problems or a demonstration of the performance.

Quit

Continue

Instruction: Introducing Learning Activities

When motivating students for an activity, be sure to inform them of the value of what they will be learning. Explain why the knowledge or skill is important in its own right and/or as a necessity for learning other knowledge or skills.

You should also emphasize the importance of the objective for students' immediate needs and interests.

Quit

Continue

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Instruction: Providing Information

PROVIDING INFORMATION

Students learning to perform a new task usually do not have the basic information needed to perform the task correctly.

For example, for the objective "to identify peninsulas on an outline map" it is necessary for students to know the characteristics of peninsulas in order to identify them correctly.

Quit

Continue

Instruction: Providing Information

Similarly, if students are to learn to perform an operation or procedure they need to know the steps involved. You must present the basic information to them, or have them get this information in some other way.

Quit

Continue

Instruction: Providing Information

Present the necessary information in a clear, concise and straightforward manner. This greatly increases the likelihood that students will be able to use it to perform the task correctly.

During this initial segment of instruction you should present only the information necessary for learning to perform the task.

Quit

Continue

Instruction: Providing Information

You should use examples to supplement the basic information when necessary. Information which could be difficult to understand should be presented along with appropriate examples or sample problems. Explain or work through them with the students.

Quit

Continue

Instruction: Providing Information

You can use examples to teach the basic information for concepts which are difficult to define. You can provide information for objectives like the following by providing examples and non-examples of the concept.

Objective: The students will identify red objects when shown red and non-red objects.

To provide information for this objective, you would display a variety of red objects and tell the students "These are red" and then display a number of objects of other colors and say "These are not red."

Quit Continue

Instruction: Providing Information

Remember, the basic information is the definition, description, or set of procedures that will enable students to perform the task stated in the objective.

Quit Continue

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Practice: Providing Information

The next few items will allow you to practice identifying appropriate information for use in instruction. The CONTINUE button will begin the practice.

Quit

Continue

Practice: Providing Information

1. Click in the box beside the statement which is the most appropriate for enabling students to perform the task stated in the objective.

Objective: The student will read the word "dog." (Note: other words could also be included in this objective.)

- ☐ Our story today is about a dog. This is the word "dog" (displays dog flashcard). We'll be reading it a lot in the story, so look closely at it.
- ☐ This word (displays dog flashcard) is "dog."
- ☐ This word (displays dog flashcard) is "dog," one of the new words in our story today. How many of you have doggies at home?

Quit

Practice: Providing Information

2. Click in the box beside the statement which is the most appropriate for enabling students to perform the task stated in the objective.

Objective: The student will identify isosceles triangles, given examples of the three types of triangles.

- ☐ There are three types of triangles: isosceles, equilateral, and scalene.
- ☐ Triangles are classified into three types: equilateral, isosceles, and scalene.
- ☐ The number of equal sides determines the type of triangle. An isosceles triangle has two equal sides.

Quit

Practice: Providing Information

3. Click in the box beside the statement which is the most appropriate for enabling students to perform the task stated in the objective.

Objective: The student will list the steps in administering mouth-to-mouth resuscitation.

- ☐ The steps in administering mouth-to-mouth resuscitation are as follows: (here each step would be listed in order).
- ☐ The students see a demonstration of mouth-to-mouth resuscitation.
- ☐ Mouth-to-mouth resuscitation should be used in cases when the person has stopped breathing or is having difficulty breathing, but the heart is still beating.

Quit

Practice: Providing Information

4. Click in the box beside the statement which is the most appropriate for enabling students to perform the task stated in the objective.

Objective: The student will compute the amount of electrical current, given the voltage and resistance.

- ☐ Current is measured in amperes, voltage in volts, and resistance in ohms.
- ☐ Increasing the voltage also increases the current, resulting in a greater number of amperes.
- ☐ To compute the current, divide the voltage by the resistance.

Quit

Practice: Providing Information

5. Click in the box beside the statement which is the most appropriate for enabling students to perform the task stated in the objective.

Objective: Given the weight of an object and the distance it is to be moved, the student will compute the work required to move the object.

- ☐ To determine the work required to move an object, multiply its weight by the distance it is to be moved.
- ☐ If you increase either the weight or the distance an object is moved, you increase the work required.
- ☐ Decreasing the weight of an object, changes the amount of work required to move it.

Quit

Practice: Providing Information

6. Click in the box beside the statement which is the most appropriate for enabling students to perform the task stated in the objective.

Objective: The student will name the letter c when it is presented in lower case.

- ☐ This is the letter c ... (Show the letter c.) ... Say "c."
- ☐ This is the letter c ... (Show the letter c.) ... what sound does it make?
- ☐ This is the letter c ... (Show the letter c.) ... what words begin with this letter?

• *Last practice item for this section.*

Quit

Practice: Providing Information

For the next exercises you will write the information you would provide to your students in order for them to meet the given objectives.

Click CONTINUE to see the next practice item.

Quit

Continue

Practice: Providing Information

7. Write the information you would provide to enable students to perform the task stated in the objective.

Objective: The student will identify peninsulas on an outline map.

Type your information in the box provided. Click the CONTINUE button when you are finished.

Quit

Continue

Practice: Providing Information

8. Write the information you would provide to enable students to perform the task stated in the objective.

Objective: The student will compute the average for a given set of numbers.

Type your information in the box provided. Click the CONTINUE button when you are finished.

Quit

Continue

BEST COPY AVAILABLE

Practice: Providing Information

9. Write the information you would provide to enable students to perform the task stated in the objective.

Objective: The student will compute the amount of electrical current, given the voltage and resistance. (Hint: Current = Voltage divided by resistance)

Type your information in the box provided. Click the CONTINUE button when you are finished.

• *Last practice item for this section.*

Quit

Continue

Summary: Providing Information

The next information is a short summary of the material you just studied about providing information for instructional objectives.

Click CONTINUE to see the summary.

Quit

Continue

Summary: Providing Information

You must provide your students with the basic information necessary to perform a new task:

- a definition
- a description
- a set of procedures

Supplement the basic information with examples whenever necessary.

Quit

Continue

Instruction: Providing Appropriate Practice

PROVIDING APPROPRIATE PRACTICE

Providing students with opportunities to practice what we want them to learn is one of the most important parts of the instructional process.

It is not appropriate to assess students on tasks that they have not had an opportunity to practice.

Appropriate practice is practice of the exact task stated in the objective. Both the student performance required and the givens will be identical to those stated in the objective.

Quit

Continue

Instruction: Providing Appropriate Practice

Recall the objective we used earlier:

> The student will identify isosceles triangles, given examples of the three types of triangles.

Providing the necessary information for identifying an isosceles triangle is a necessary step to enable them to identify isosceles triangles.

For many students this information will not be enough to enable them to perform the task. They will need practice in which they are presented with each of the three types of triangles and are asked to identify the isosceles.

Quit Continue

Instruction: Providing Appropriate Practice

The amount of practice needed to perform a task well usually increases for complex tasks. You may need to break a complex task into steps that the students can practice individually or in related sets.

After students learn the component steps you can combine the steps and have the students practice the entire task.

Quit Continue

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Practice: Providing Appropriate Practice

The next few items will allow you to practice identifying appropriate practice.

Click CONTINUE to see the first practice item.

Quit

Continue

Practice: Providing Appropriate Practice

10. Click in the box beside the activity which is the most appropriate for providing practice related to the objective.

Objective: The student will read the new words from each story contained in the first grade reading book.

- ☐ The children use cut-out letters to make the new words from each story and to increase their perceptual abilities.
- ☐ The children are shown the new words from each story individually on flashcards and are asked to read each word.
- ☐ The children act out each story to increase their comprehension of the new words and the story.

Quit

Practice: Providing Appropriate Practice

11. Click in the box beside the activity which is the most appropriate for providing practice related to the objective.

Objective: The student will compute the amount of interest on any simple-interest loan, given the principal, interest rate, and time period for the loan.

- ☐ A banker is invited to visit the class. She explains simple-interest loans and demonstrates how to calculate the amount of interest for different principal amounts, interest rates, and time periods.
- ☐ Students complete a worksheet containing problems in which the principal, interest rate, and time period are given for several different simple-interest loans. Students compute the amount of interest for each loan.

Quit

Practice: Providing Appropriate Practice

12. Click in the box beside the activity which is the most appropriate for providing practice related to the objective.

Objective: Given printed advertisements, the student will name the type(s) of advertising appeal(s) used in each.

- ☐ Students are asked to write the name of each type of advertising appeal, and for each appeal, to write a sample advertisement about a real product.
- ☐ Students are given printed advertisements from newspapers or magazines and are asked to write the name of each type of appeal used in each.
- ☐ Students are asked to bring to class one or more printed advertisements illustrating each type of advertising appeal.

Quit

Practice: Providing Appropriate Practice

13. Click in the box beside the activity which is the most appropriate for providing practice related to the objective.

Objective: The students will write a descriptive essay of at least 300 words.

- ☐ Have each student choose a topic and write an essay describing it.
- ☐ Have the students read several examples of good descriptive essays.
- ☐ Write a descriptive essay as a class activity by calling on a different student to contribute each new sentence.

Quit

Practice: Providing Appropriate Practice

14. Click in the box beside the activity which is the most appropriate for providing practice related to the objective.

Objective: The students will name the natural regions (desert, grassland, forest) represented in pictures of those regions.

- ☐ Hold up pictures of natural regions and have the students name them.
- ☐ Give students pictures of natural regions and have the students describe the natural features.
- ☐ Give students pictures of natural regions and then state the natural features until other students can guess the name of the pictured region.

Quit

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Practice: Providing Appropriate Practice

15. Click in the box beside the activity which is the most appropriate for providing practice related to the objective.

Objective: The student will prepare an outline for a persuasive speech.

- ☐ Give the students two or three outlines for persuasive speeches. Have them select the best outline and discuss its characteristics.
- ☐ Give the students a topic for a persuasive speech and direct them to write an outline related to the topic given.
- ☐ Give the students outlines of persuasive speeches and have them discuss the characteristics of each one.

• *Last practice item for this section.*

Quit

Practice: Providing Appropriate Practice

For the next exercises you will write the practice activities you would provide to your students in order for them to meet the given objectives.

Be sure to give both the form of the materials (for example, flashcards, list of words, story), if any, to be used in the activity and the nature of the student responses.

Quit

Continue

Practice: Providing Appropriate Practice

16. Write an activity that would provide appropriate practice for this objective.

Objective: The student will identify the topic sentences in given paragraphs.

Type your activity in the box provided. Click the CONTINUE button when you are finished.

Quit

Continue

Practice: Providing Appropriate Practice

17. Write an activity that would provide appropriate practice for this objective.

Objective: Given any one-digit numeral, the student will construct a set of objects corresponding to the given numeral.

Type your activity in the box provided. Click the CONTINUE button when you are finished.

Quit

Continue

Practice: Providing Appropriate Practice

18. Write an activity that would provide appropriate practice for this objective.

Objective: The students will write a descriptive essay of at least 300 words.

Type your activity in the box provided. Click the CONTINUE button when you are finished.

- *Last practice item in this section.*

Quit

Continue

Summary: Providing Appropriate Practice

The next item is a short summary of what you have just studied about providing appropriate practice.

Click CONTINUE to see the summary.

Quit

Continue

Summary: Providing Appropriate Practice

Good instruction will include practice of the exact task stated in the objective because such practice helps students learn.

Quit

Continue

Instruction: Providing Individual and Frequent

PROVIDING INDIVIDUAL AND FREQUENT PRACTICE

Practice really makes a difference. So does the type of practice we give students.

For instruction to be most effective, students should have the opportunity to practice individually and often.

Quit

Continue

Instruction: Providing Individual and Frequent

INDIVIDUAL PRACTICE

It is important to be sure that all students have the opportunity for individual practice on an objective.

Some observations of classroom teaching have shown that in many oral practice activities, practice is not evenly distributed among individual students.

You can use a few simple guidelines for individual practice to make sure that all students have more equal and active participation.

Quit

Continue

Instruction: Providing Individual and Frequent

GUIDELINES FOR INDIVIDUAL PRACTICE

1. Distribute individual practice evenly across all students. Do not use a detectable pattern that will enable students to know who will be called on next.

2. Call on boys as often as girls, nonvolunteers as often as volunteers, individuals more frequently than groups, students who are having difficulties as often as those who are not.

3. Allow time for all students to think of an answer before calling on an individual by name.

Quit

Continue

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Instruction: Providing Individual and Frequent

The purpose of distributing practice evenly across all students is to give each student a relatively equal number of opportunities to practice. A detectable pattern of calling on students should be avoided because it permits a student to participate by paying attention only when his or her turn is near.

Calling on an individual by name after students have had time to think of the answer to a question, rather than before the question is asked or time is allowed to think of the answer, will help ensure that the other students pay attention.

Quit

Continue

Instruction: Providing Individual and Frequent

FREQUENT PRACTICE

Practice activities are often designed to provide either initial student practice on an objective or review for one or more objectives.

These activities will be most effective when you arrange conditions so that as many students as possible have a high rate of individual practice throughout the activity.

Quit

Continue

Instruction: Providing Individual and Frequent

High rates of individual practice are obtained when individual students answer each item on their own during the same time period and when students work in pairs and alternately answer sets of items individually.

A good guideline for providing the most desirable amount of practice is as follows:

> Provide as high a rate of individual practice as possible for each student during the activity. Avoid factors that reduce the individual practice rate.

Quit

Continue

Practice: Providing Individual and Frequent Practice

The next few items will allow you to practice applying the guidelines for individual and frequent practice.

Click CONTINUE to practice.

Quit

Continue

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Practice: Providing Individual and Frequent Practice

19. Click in the box beside the activity which would be best for the objective " The students will be able to give good descriptive talks."

- ☐ Have each student plan a descriptive talk. To avoid excessive use of class time, select at random a limited number of students to actually give their talks to the class.
- ☐ Have each student plan a descriptive talk and give it to the class.
- ☐ Have each student plan a descriptive talk in order to provide the practice for all students. Make giving of the talks optional for each student to spare shy and limited-ability students the discomfort of actually giving the talk.

Quit

Practice: Providing Individual and Frequent Practice

20. Click in the box beside the procedure which would be best for calling on students during oral practice.

- ☐ Call exclusively on children who are having difficulty with the learning task, because they need the most practice.
- ☐ To keep the number of turns equal for all students, call on individual students in order as listed in your class roll book.
- ☐ Call on students without using any fixed pattern, placing checks on a list of names to see that all students are called upon about an equal number of times.

Quit

Practice: Providing Individual and Frequent Practice

21. Click in the box beside the question which would be the best way to call for a response during an oral practice activity.

- ☐ "What is this ... Joe?"
- ☐ "Who would like to tell me what this is?"
- ☐ "Joe ... what is this?"
- ☐ "What is this?"

Quit

Practice: Providing Individual and Frequent Practice

22. Click in the box beside the activity which would provide the most frequent practice for the objective "The students will classify given foods into the correct groups from the four food groups."

- ☐ Call on students individually, without using a fixed pattern, to name the food group for each food as you display food cards one at a time. Be sure that all students are called on an equal number of times.
- ☐ Group the students in pairs. Give each pair a set of cards with a food shown on the front side and the name of the food and its food group on the back. Have the students in each pair drill each other by showing their partner the food and having the partner name the food group.

Quit

Practice: Providing Individual and Frequent Practice

23. Which activity would provide the most frequent practice for the objective "The student will read aloud in a fluent manner"?

- ☐ Have the students turn to a story in their readers; then call on individual students in a random manner to read a paragraph aloud.
- ☐ Divide the students into groups of three and have the students in each group take turns reading paragraphs aloud from a story in their readers.

Practice: Providing Individual and Frequent Practice

24. Click in the box beside the activity which would provide the most desirable amount of practice for the objective "The student will multiply one-digit numbers by 5."

- ☐ Have each student practice writing out each multiplication fact as a related addition fact (for example, 3 x 5 = 5 + 5 + 5 = 15).
- ☐ Hold up flashcards of the 5s and call on the entire class to give the products.
- ☐ Give each student a worksheet consisting of multiplication fact problems which involve multiplying one-digit numbers by 5.

• *Last practice item for this section.*

Quit

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Summary: Providing Individual and Frequent Practice

The next item summarizes what you have just studied about providing individual and frequent practice.

Click CONTINUE to see the summary.

Quit

Continue

Summary: Providing Individual and Frequent Practice

Remember the guidelines for individual oral practice:

- Call on boys as often as girls
- Call on nonvolunteers as often as volunteers
- Call on individuals as often as groups
- Call on students who are having difficulties as often as students who are doing well.

Be sure to provide as much individual practice as possible for each student during the activity.

Quit

Continue

Instruction: Providing Knowledge of Results

PROVIDING KNOWLEDGE OF RESULTS

Knowledge of results, or feedback as it is often called, is information given to students about the correctness of their responses.

You may provide knowledge of results for your students in very simple form, such as by making a checkmark to indicate incorrect answers or by saying "yes" or "good" for correct oral responses and by saying "no" or by giving the correct answer for incorrect oral responses.

Quit

Continue

Instruction: Providing Knowledge of Results

Research indicates that knowledge of results is often effective in helping students learn. The form and manner in which feedback is given, however, are important in determining its effectiveness.

Providing knowledge of results for oral practice activities involving factual information is a relatively simple matter.

Quit

Continue

Instruction: Providing Knowledge of Results

When the student answers correctly make a brief positive remark (for example, "Good," "That's right," or "Very good, Carol").

This technique affirms to the group that the answer is correct and positively acknowledges the student's success.

Quit

Continue

Instruction: Providing Knowledge of Results

When the student does not answer or answers incorrectly tactfully give the correct answer. Then repeat the item and have the same student answer it.

This will provide the correct answer and give the student an opportunity to practice answering the item correctly. When the student looks at or hears the question again they must associate the answer with the question instead of simply echoing the answer you gave.

Quit

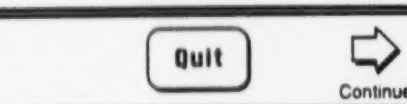
Continue

Instruction: Providing Knowledge of Results

When the student is hesitant and you feel some help is in order give a choice of the correct answer and a feasible incorrect one ("Is it ... or ...?").

Do not use more elaborate hints than this. If the student answers the two choice prompt incorrectly, use the procedure for incorrect answers. When you provide prompts (hints), you should use only very direct ones that have a high likelihood of yielding the correct answer.

Quit

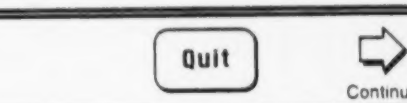


Instruction: Providing Knowledge of Results

The guidelines for knowledge of results for written work are different from those for oral activities. They are:

1. comment
2. mark and return quickly
3. review, and
4. have students correct their errors.

Quit



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Instruction: Providing Knowledge of Results

Comment on longer reports and essays by providing a positive written comment when the student has done well.

Use an encouraging, but honest, comment if you feel the student tried hard, even if the paper is not a particularly good one.

Give tactful and explicit suggestions for improvement where students can make appropriate improvements.

Quit

Continue

Instruction: Providing Knowledge of Results

Mark and return papers quickly by limiting your markings or corrections to the errors which are related to the instructional objective(s) for which the paper was assigned and on the other most common major errors made by each student.

Keep a list of the few most common types of errors made by the class, so that you can refer to them and have the students look for them in their own work when you review the papers with the class.

Quit

Continue

Instruction: Providing Knowledge of Results

Review short-answer papers by briefly giving each correct answer to the students.

For longer papers focus the review on the most common major errors that you noted in marking the papers.

Quit

Continue

Instruction: Providing Knowledge of Results

Have the students correct their errors whenever it is feasible.

For short-answer items have them read or hear each question and write the answer, so that they make the association between the correct answer and the question.

For long papers, have them correct the major errors that you marked on their papers.

Quit

Continue

Practice: Providing Knowledge of Results

The next few items will allow you to practice identifying appropriate knowledge of results.

Click CONTINUE to practice.

Quit

Practice: Providing Knowledge of Results

25. You have just called on Susan to read the word "saw." She says "was." Which procedure would be best for providing knowledge of results?

☐ Have Susan look at the word again. Say "It's something we use to cut wood, Susan. Now try it again."

☐ Have Susan look at it again. Say "It's 'saw,' Susan. Now you read it."

☐ Say "No, Susan, but you're close. You just reversed the letters. Now look at it closely and try it again.

Quit

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Practice: Providing Knowledge of Results

26. Ricardo has just given a correct answer. Which of the following would be best to say?

- ☐ "That's right, Ricardo." Then explain why his answer is correct.
- ☐ "Good work, Ricardo. You got it right so you may call on the next person."
- ☐ "Good, Ricardo."
- ☐ "Very good, let's see if you can get two in a row."

Quit

Practice: Providing Knowledge of Results

27. Beth is called on to say the Spanish word for "green." She is hesitant in making her response. Which comment provides the best way to prompt her?

- ☐ "Is it 'verde' or 'azul'?"
- ☐ "There is a tree called a palo verde tree. Does that help you?"
- ☐ "It starts with the letter v, Beth."

Quit

Practice: Providing Knowledge of Results

28. John is asked to state three characteristics of mammals. He names two characteristics but cannot remember the third. Which comment provides the best feedback in this situation?

- ☐ "John, you have only given two characteristics. Who can tell John what the third characteristic is?"
- ☐ "You named two characteristics, John. The third characteristic is that mammals are warm blooded. Now state all three characteristics."
- ☐ "Think hard, John. Two out of three is good. Now, how does a dog differ from a fish?"

Quit

Practice: Providing Knowledge of Results

29. Which is the best procedure for providing knowledge of results for the objective "The student will write essays that contain no sentence fragments or run-on sentences."

- ☐ Mark everything that is incorrect, including the sentence fragments and run-on sentences. Return and review the papers.
- ☐ Mark only the sentence fragments and run-on sentences, plus the other most common errors made by each student. Return and review the papers. Have the students rewrite the sentence fragments and run-ons, plus all other errors that you marked, so that they are correct.

Quit

Practice: Providing Knowledge of Results

30. For the objective "The student will write accurate reports of scientific experiments," which of the following choices best describes the reports on which you should write suggestions for improvements?

- ☐ All reports for which you can suggest appropriate improvements.
- ☐ Reports that contain the most common errors made by the class.
- ☐ Reports of the students who clearly tried hard on the assignment, even if their reports are not particularly good.

• Last practice item for this section.

Quit

Summary: Providing Knowledge of Results

The next items summarize what you have just studied about knowledge of results.

Click CONTINUE to see the summary.

Quit

Continue

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Summary: Providing Knowledge of Results

The guidelines for knowledge of results for oral activities are:

1. for correct answers, affirm to the group that the answer is correct and positively acknowledge the student's success.

2. for incorrect answers or for students who do not respond, provide the correct answer and give the student an opportunity to practice answering the item correctly.

Quit

Continue

Summary: Providing Knowledge of Results

The procedures you should use for providing knowledge of results for written work are:

1. comment
2. mark and return quickly
3. review, and
4. have students correct their errors.

Quit

Continue

Instruction: Reviewing the Activity

REVIEWING THE ACTIVITY

A good way to conclude an instructional activity is with a brief review or summary of the important points covered in it.

Quit

Continue

Instruction: Reviewing the Activity

You should paraphrase the instructional objective in easily understood language.

It is also a good idea to review the key instructional information that was presented.

A reminder of why the new learning is important and/or how it is used in real-life situations is also a worthwhile element to include in the review.

Quit

Continue

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Review: Effective Instruction

The next few items review Lesson 3, Effective Instruction.

Click CONTINUE to see the review.

Quit

Continue

Review: Effective Instruction

Review of What You've Learned

The skills covered in this chapter provide a basis for helping you to plan and deliver effective instruction.

The basic parts of a well-planned lesson or instructional activity are:

- introducing the activity
- providing information
- providing practice
- providing knowledge of results
- reviewing the activity.

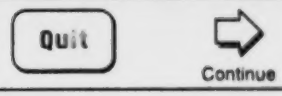
Quit

Continue

Review: Effective Instruction

The skills you should have acquired from this session relate to providing students with appropriate instructional information, practice opportunities, and knowledge of results.

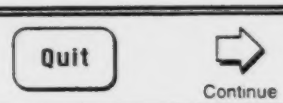
Your use of these skills in the classroom will help your students to be highly competent learners.

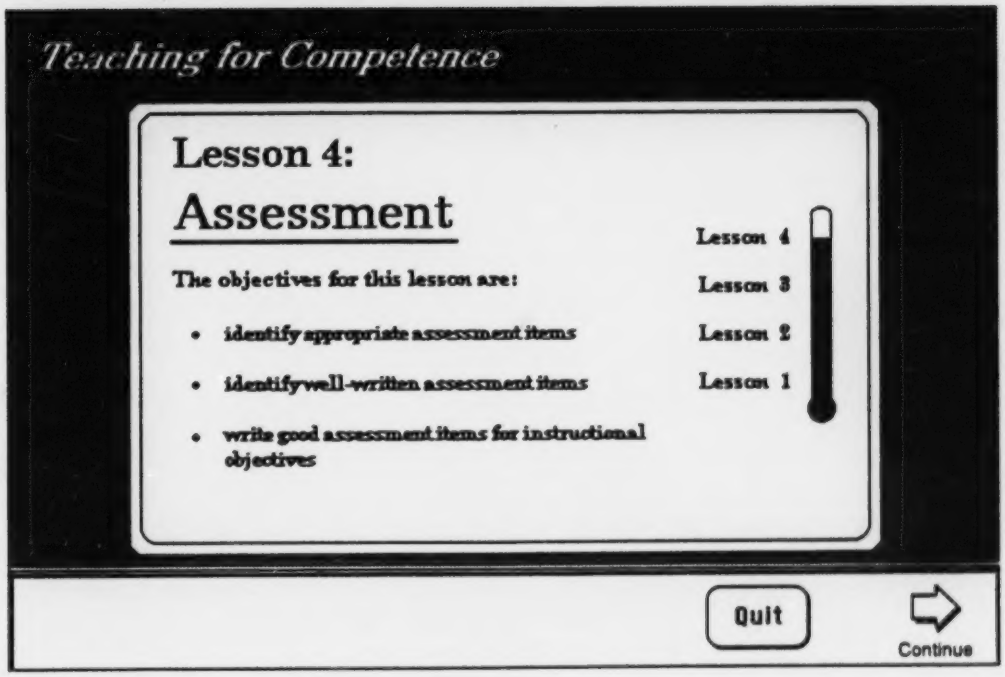


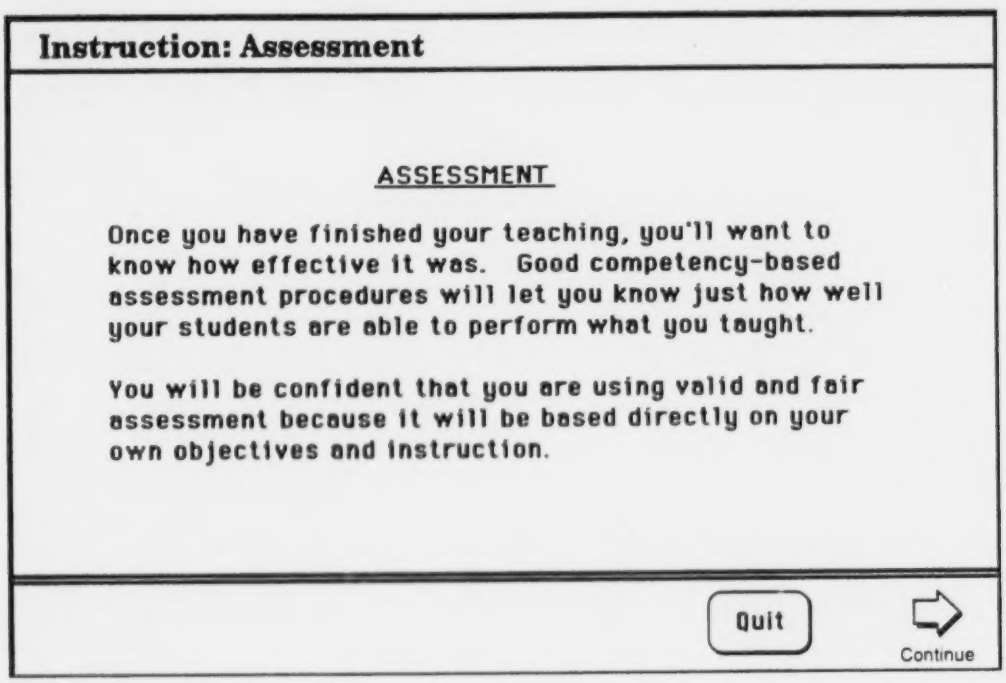
End of Lesson 3

You have completed lesson 3.

Click on the Continue button to go to Lesson 4.






Instruction: Assessment
ASSESSMENT
Once you have finished your teaching, you'll want to know how effective it was. Good competency-based assessment procedures will let you know just how well your students are able to perform what you taught.
You will be confident that you are using valid and fair assessment because it will be based directly on your own objectives and instruction.
Quit
Continue

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Instruction: Assessment

The purpose of this lesson is to teach you to identify good assessment items. When you have completed it you should be able to carry out the following objectives:

- Identify appropriate assessment items for given instructional objectives.
- Identify well-written items.
- Write good assessment items for instructional objectives.

Quit

Continue

Instruction: Identifying Appropriate Assessment Items

IDENTIFYING APPROPRIATE

ASSESSMENT ITEMS

The assessment items you write for your instructional objectives are used to determine whether students have acquired the skills and attitudes reflected in the objectives.

Quit

Continue

Instruction: Identifying Appropriate Assessment Items

The assessment items you use must assess the exact performances called for in the objectives.

The conditions, or givens, in an objective must also be included in the assessment item.

Quit

Continue

Instruction: Identifying Appropriate Assessment Items

Whether or not an assessment item is appropriate for an objective can be determined by asking two questions:

1. Does the assessment item require the same performance of the student as that specified in the instructional objective?

2. Does the assessment item provide the same conditions or givens as those specified in the instructional objective?

Quit

Continue

BEST COPY AVAILABLE

Instruction: Identifying Appropriate Assessment Items

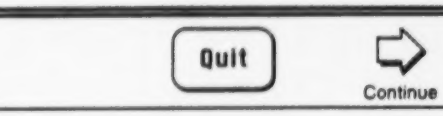
QUESTIONS:

1. Same performance as the objective?
2. Same conditions as the objective?

If the answer to both questions is "yes," then the assessment item is appropriate for the objective.

If the answer to either question is "no," then you must rewrite the item so that it relates directly to the objective.

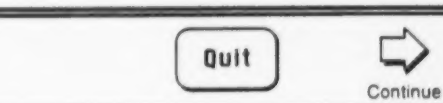
Quit



Practice: Identifying Appropriate Assessment Items

The next few items will allow you to practice identifying appropriate assessment items for your instructional objectives. Clicking on the CONTINUE button will start the practice items.

Quit



Practice: Identifying Appropriate Assessment Items

1. Is the assessment item appropriate for the objective?

Objective: The student will demonstrate the appropriate procedure for administering cardiopulmonary resuscitation.

Assessment item: Describe each step in the procedure for administering cardiopulmonary resuscitation, as shown in the illustrations below. (A set of sequenced illustrations is given.)

☐ YES ☐ NO

Quit

Practice: Identifying Appropriate Assessment Items

2. Is the assessment item appropriate for the objective?

Objective: Given pictures of simple levers, the student will name from memory each type of lever pictured.

Assessment item: Match the type of lever named in column A with the appropriate lever pictured in column B. (Column A is a list of lever names: first class, second class, and third class. Column B contains pictures of simple levers: can opener, wheelbarrow, etc..)

☐ YES ☐ NO

Quit

Practice: Identifying Appropriate Assessment Items

3. Is the assessment item appropriate for the objective?

Objective: The student will state the time shown on a clock to the nearest five minutes.

Assessment item: Teacher sets the hands on a geared demonstration clock and asks the student, "What time is showing on the clock?"

☐ YES ☐ NO

Quit

Practice: Identifying Appropriate Assessment Items

4. Is the assessment item appropriate for the objective?

Objective: The student will identify pairs of objects that are the same size.

Assessment item: Teacher gives the student pairs of objects that are different in size, then asks the student to "point to the bigger object in each pair."

☐ YES ☐ NO

Quit

Practice: Identifying Appropriate Assessment Items

5. Is the assessment item appropriate for the objective?

Objective: The student will add proper fractions with like denominators.

Assessment item: Solve the following problems.

$\frac{1}{5} + \frac{2}{5} =$ $\frac{1}{6} + \frac{1}{6} =$ $\frac{3}{8} + \frac{2}{8} =$ $\frac{1}{9} + \frac{4}{9} =$

☐ YES ☐ NO

Quit

Practice: Identifying Appropriate Assessment Items

6. Is this assessment item appropriate for the objective?

Objective: Given a list of what, where, or when reference questions, the student will write the name of an appropriate reference resource for answering each question.

Assessment item: What reference book would you use to answer the following questions?

a. When was Abraham Lincoln born?_____(book)
b. What is a synonym?_____(book)
c. Where is the highest mountain in Africa?____(book)

☐ YES ☐ NO

• Last practice item for this section.

Quit

Summary: Identifying Appropriate Assessment

The next information is a short summary of what you have just studied about identifying appropriate assessment items for instructional objectives.

Click CONTINUE to see the summary.

Quit

Continue

Summary: Identifying Appropriate Assessment

Remember, appropriate assessment items will have the same student performance and conditions (or givens) as the instructional objective.

Quit

Continue

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Instruction: Identifying Well-written Assessment Items

IDENTIFYING WELL-WRITTEN

ASSESSMENT ITEMS

Well-written assessment items are clearly written and easily understood by students.

Well-written assessment items do not contain prompts or clues for the correct answers.

Quit

Continue

Instruction: Identifying Well-written Assessment Items

There are many common practices which result in unclear assessment items:

- unnecessary complexity
- allowing multiple correct answers
- asking students to put things in order without telling them the basis for the ordering
- asking for a description without stating the nature of the description required.

Quit

Continue

Instruction: Identifying Well-written Assessment Items

The following example illustrates the problem of unnecessary complexity in an assessment item:

The four food groups provide all of the nutrients needed for healthy bodies. Name them.

This item can be rewritten more clearly as a straightforward statement:

Name the four food groups.

Quit Continue

Instruction: Identifying Well-written Assessment Items

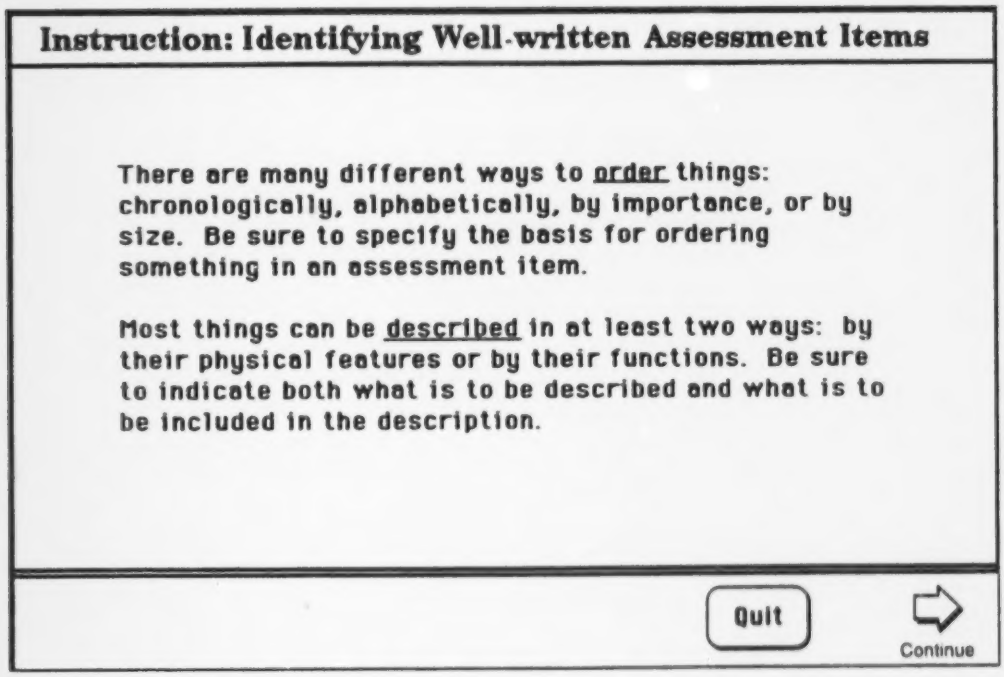
The following example illustrates the problem of multiple correct answers in an assessment item:

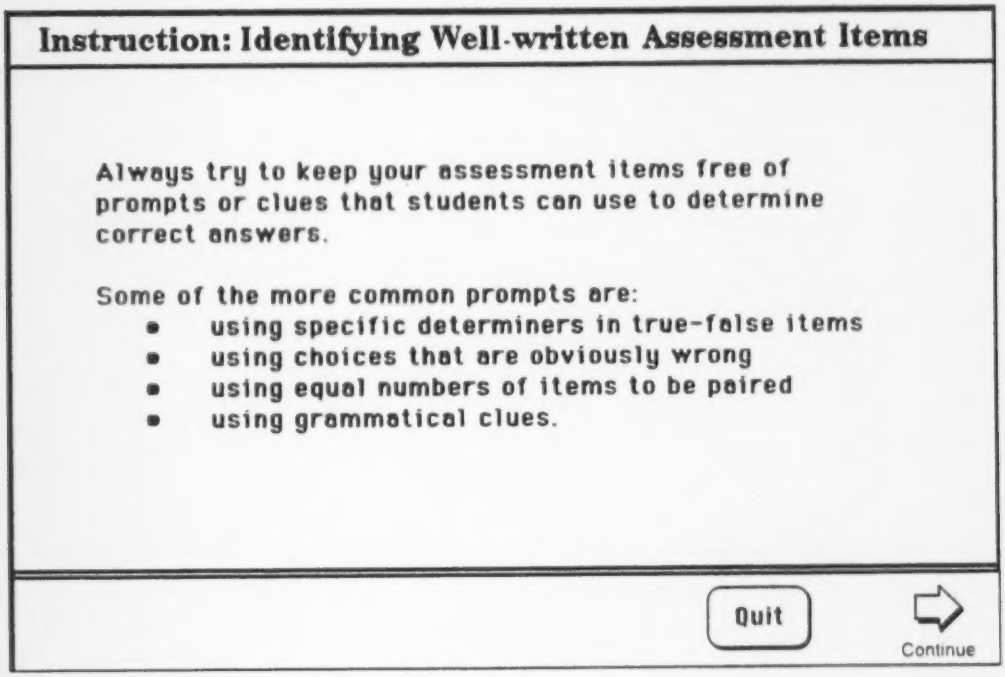
Pacific Ocean salmon spawn in _____.

Correct answers include fresh water, rivers, the fall, pairs, the Northwestern states. This problem can be avoided by rewriting the item into a straightforward question.

In what type of water do Pacific Salmon spawn?

Quit Continue


Instruction: Identifying Well-written Assessment Items
There are many different ways to order things: chronologically, alphabetically, by importance, or by size. Be sure to specify the basis for ordering something in an assessment item.
Most things can be described in at least two ways: by their physical features or by their functions. Be sure to indicate both what is to be described and what is to be included in the description.
Quit
Continue


Instruction: Identifying Well-written Assessment Items
Always try to keep your assessment items free of prompts or clues that students can use to determine correct answers.
Some of the more common prompts are:
• using specific determiners in true-false items
• using choices that are obviously wrong
• using equal numbers of items to be paired
• using grammatical clues.
Quit
Continue

Instruction: Identifying Well-written Assessment Items

True-false items that include words such as "always," "never," "only," or "no" are usually false, whereas items that include words such as "frequently," "sometimes," or "may" are usually true.

Quit

Continue

Instruction: Identifying Well-written Assessment Items

When multiple-choice items contain choices that are obviously wrong students have a greater chance of selecting the correct alternative.

Example: *How many centimeters are there in one meter?*

a. 100 b. 1.00 c. .001 d. 3.10

For any student who has studied the metric system, choice d is implausible. The chance that a student could guess the correct answer is greater because at least one choice can be easily eliminated.

Quit

Continue

Instruction: Identifying Well-written Assessment Items

Using equal numbers of items to be paired in matching items also increases the chance of a student being able to guess correctly on items not previously learned.

Example: *Match each inventor with his invention.*

Joseph Henry	*Electric light*
Thomas Edison	*Electromagnet*
Samuel Morse	*Electric telegraph*

A student who learned only about Edison and Morse would still be able to correctly match Henry's invention because it would be the only choice left. You should increase either the number of inventors or inventions.

Quit

Continue

Instruction: Identifying Well-written Assessment Items

Including grammatical clues in multiple-choice, completion, and matching items is another form of prompting. Articles such as "a" and "an," plural word forms, and gender forms may provide clues to students that enable them to answer correctly without having learned the content which was taught.

Quit

Continue

Practice: Identifying Well-written Assessment Items

The next few items will allow you to practice identifying well-written assessment items. Click CONTINUE to see the practice items.

Quit

Continue

Practice: Identifying Well-written Assessment Items

7. Is this item well written?

Number the following planets in correct order.

_____*Mercury* _____*Mars* _____*Saturn*
_____*Venus* _____*Jupiter*

☐ YES ☐ NO

Quit

Practice: Identifying Well-written Assessment Items

8. Is this assessment item well-written?

How many centimeters are there in one meter?

☐ YES ☐ NO

Quit

Practice: Identifying Well-written Assessment Items

9. Is this assessment well-written?

Italy is a _____

a. island
b. isthmus
c. peninsula

☐ YES ☐ NO

Quit

Practice: Identifying Well-written Assessment Items

10. Is this assessment item well-written?

_____ *A police officer can never search you without a search warrant.*

☐ YES ☐ NO

Quit

Practice: Identifying Well-written Assessment Items

11. Is this assessment item well-written?

Write an original verse that has both the form and the thematic characteristics of haiku.

☐ YES ☐ NO

Quit

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Practice: Identifying Well-written Assessment Items

12. Is this assessment item well-written?

List the following names in alphabetical order:

Abraham, Abel, Alabama, Aaron, Ableman.

☐ YES ☐ NO

* Last practice item in this section.

Quit

Summary: Identifying Well-written Assessment Items

The next item summarizes what you just studied about identifying well-written assessment items for instructional objectives.

Click CONTINUE to see a summary.

Quit

Continue

Summary: Identifying Well-written Assessment Items

Well-written assessment items are clearly stated and do not contain information which prompts the student to select the correct answer.

Quit

Continue

Instruction: Writing Assessment Items

WRITING ASSESSMENT ITEMS

The items for an objective must:

1. require the student to perform the exact task specified in the objective, and

2. contain the conditions or givens, if any, specified in the objective.

Quit

Continue

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Instruction: Writing Assessment Items

Some common types of test performances are identifying and naming.

We often ask students to identify examples of concepts and principles, appropriate attitudes, or correct ways of doing tasks. When an instructional objective asks a student to "select" or "distinguish between" we must use an assessment that has a student pick out (or identify) correct answers.

Quit

Continue

Instruction: Writing Assessment Items

Assessment items must include examples and non-examples of the things to be identified and directions for how to indicate the examples.

Example: *The student will identify the pennisulas on an outline map.*

The item should include an outline map (the given) that contains examples and non-examples of peninsulas (isthmuses, islands, or capes) and includes directions for identifying the examples. Directions such as "Point to the peninsulas" or "Mark the peninsulas with an X" indicate how the student will identify the examples.

Quit

Continue

Instruction: Writing Assessment Items

Another task that students are often asked to perform is to give the names for objects, processes, concepts, or principles. Objectives that specify performances such as label and list involve naming something from memory.

It is important to determine whether the names are to be associated with specific objects, listed in a particular order, or simply listed in any order.

Quit Continue

Instruction: Writing Assessment Items

Example: *Label the lens, iris, retina, and optic nerve on a longitudinal-section illustration of the eye.*

This objective requires associating names with specific illustrated objects (parts of the eye) and should include a longitudinal-section drawing of the eye.

The parts of the eye to be named would be indicated on the illustration, and the directions would require the student to write the name for each part indicated.

Quit Continue

Instruction: Writing Assessment Items

Examples:

- *List the major geologic eras from earliest to most recent.*
- *Name the three branches of the federal government.*

Assessment items for these objectives would simply be restatements of the instructional objectives. They do not require an association of the names with specific objects or illustrations. The first requires the names to be in order, but the second does not.

Quit Continue

Instruction: Writing Assessment Items

Many of the things students are expected to learn are more complex than identifying and naming. Some examples of complex performances are:

- *Describe a painting,*
- *Operate a slide projector,*
- *Skip rope, and*
- *Make a leather key case.*

Quit Continue

Instruction: Writing Assessment Items

Some complex performances must be assessed at the time and place they occur. Operating a slide projector and skipping rope are examples of this.

Other complex performances result in products that can be assessed without directly observing the performance. Describing a painting and a leather key case are products that may be examined after their production to determine if students have learned the desired skills.

Quit

Continue

Instruction: Writing Assessment Items

Assessment for an objective requiring a complex performance or student product involves:

1. directing the student to perform the tasks stated in the objective,
2. providing the givens, if any, and
3. checking the student's performance or product against specified criteria.

Quit

Continue

Instruction: Writing Assessment Items

The criteria used to assess complex performances should be limited to the important characteristics of the performance or product. It is preferable to set criteria that can be checked on an "all-or-nothing" basis rather than rated on a continuous scale.

Quit

Continue

Instruction: Writing Assessment Items

Performance Assessment Objective: *The student will do two forward rolls (somersaults) in succession.*

If you were assessing this objective you would tell the students to do two forward rolls and would check each performance using specific assessment criteria. The criteria might include using proper form for each roll, completing two rolls in a continuous motion, and staying on the tumbling mat.

Quit

Continue

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Instruction: Writing Assessment Items

Product Assessment *Objective: The student will write an original verse that has the form and the thematic characteristics of haiku.*

When assessing this objective you would tell the students to write an original haiku. The finished verse would be assessed using specific criteria such as: writes an original verse, uses three lines with 5-7-5 syllable pattern, and states or implies a relationship between two seemingly unrelated things.

Quit Continue

Practice: Writing Assessment Items

The next few items will allow you to practice writing assessment items.

Click CONTINUE to practice.

Quit Continue

Practice: Writing Assessment Items

13. Write an item that would assess performance for this objective.

Objective: The student will identify the squares, given examples of squares and other four-sided figures.

Type your assessment item in the box provided.

Click the CONTINUE button when you are finished.

Quit

Continue

Practice: Writing Assessment Items

14. Write an item that would assess performance for this objective.

Objective: The student will label the crown and root areas on an illustration of a tooth.

Type your assessment item in the box provided.

Click the CONTINUE button when you are finished.

Quit

Continue

Practice: Writing Assessment Items

15. Write an item that would assess performance for this objective.

Objective: The student will name the saws used in wood shop, when shown actual saws of each type. (Note: the saws are rip, crosscut, keyhole, and coping.)

Type your assessment item in the box provided.

Click the CONTINUE button when you are finished.

- Last practice item for this section.

Quit Continue

Summary: Writing Assessment Items

The next item is a short summary of what you have just studied about writing assessment items.

Click CONTINUE to see the summary.

Quit Continue

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Summary: Writing Assessment Items

When you assess student performance remember to:

1. require the student to perform the exact task specified in the objective and
2. provide the conditions or givens, if any, as specified in the objective.

When you assess a complex performance or student product you must:

1. direct the student to perform the tasks in the objective
2. provide the givens, if any, and
3. check performance or product against specified criteria.

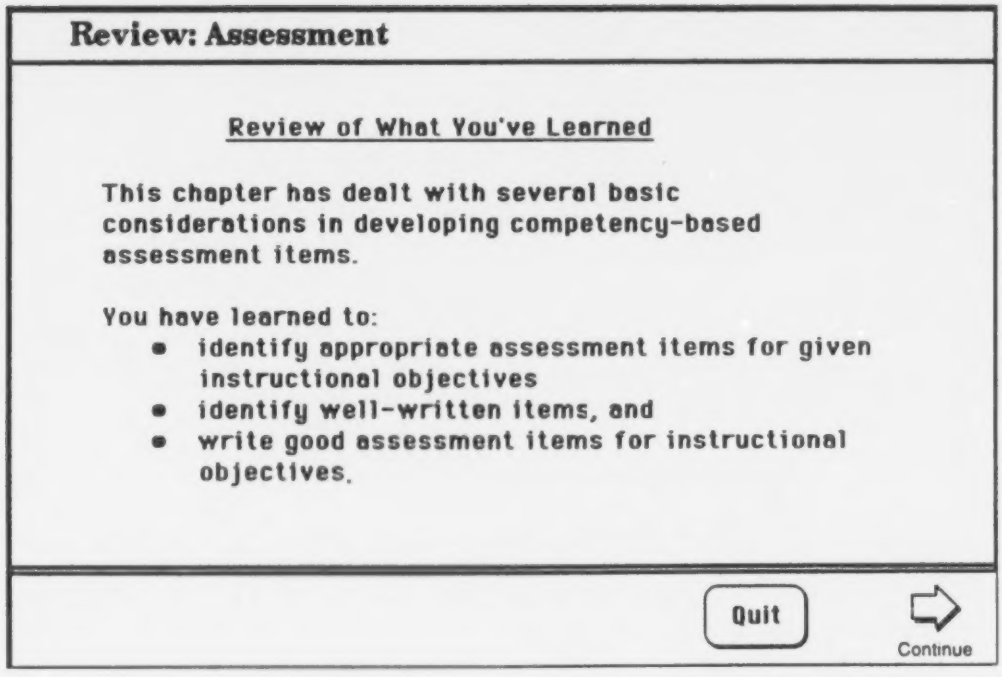
Continue

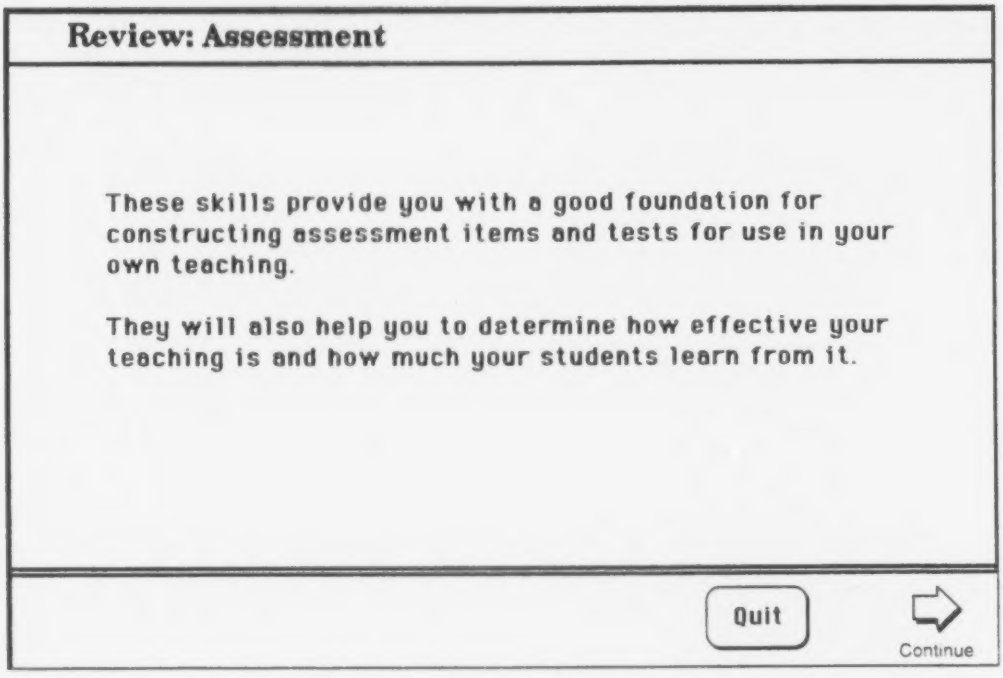
Review: Assessment

The next few items present a review of Lesson 4, Assessment. Click CONTINUE to see the review.

Quit

Continue


Review: Assessment
Review of What You've Learned
This chapter has dealt with several basic considerations in developing competency-based assessment items.
You have learned to:
• identify appropriate assessment items for given instructional objectives
• identify well-written items, and
• write good assessment items for instructional objectives.
Quit
Continue


Review: Assessment
These skills provide you with a good foundation for constructing assessment items and tests for use in your own teaching.
They will also help you to determine how effective your teaching is and how much your students learn from it.
Quit
Continue

End of Program

You have completed Lesson 4.

To complete the program, click on the Continue button and complete the questionnaire.

Continue

Questionnaire

Please express your opinion about the statement you will see on each screen in this questionnaire. Click one of the buttons below the statement. You may change your response by clicking any other button. When you are ready to go on, click the Continue button.

#1

The program was easy.

Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
○	○	○	○	○

Continue

Questionnaire

#2

I would like to learn more about Competency-Based Instruction.

Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
○	○	○	○	○

Continue

Questionnaire

#3

I tried hard to do well in the program.

Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
○	○	○	○	○

Continue

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Questionnaire

#4

I would tell other students to use this program if they wanted to learn about Competency-Based Instruction.

Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
○	○	○	○	○

Continue

Questionnaire

#5

Overall, I liked the program.

Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
○	○	○	○	○

Continue

Questionnaire

#6

I like this program better in computer form than if it were in book form.

Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
○	○	○	○	○

Continue

Questionnaire

#7

If I had to work on another computer program, I would prefer one that provided a lot of instruction and practice.

Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
○	○	○	○	○

Continue

Questionnaire

#8

I had control over what I studied in this program.

Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
○	○	○	○	○

Questionnaire

#9

I had enough opportunities to practice answering questions in the program.

Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
○	○	○	○	○

Questionnaire

#10

This was a good way to learn the content.

Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
○	○	○	○	○

Continue

Questionnaire

#11

I was able to adjust the program to get the amount of practice I needed.

Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
○	○	○	○	○

Continue

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Questionnaire

#12

My previous computer experience helped me to learn the material in this program.

Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
○	○	○	○	○

Continue

Questionnaire

#13

The program was:

Way too long	A little long	About right	A little too short	Way too Short
○	○	○	○	○

Continue

Questionnaire

#14

In the future, what kinds of learning activities would you like to do?

- ○ Competency-Based Instruction on Computers
- ○ Another Subject on Computers
- ○ Competency-Based Instruction Without Computers
- ○ Another Subject Without Computers

End of Program

CONGRATULATIONS! You have completed the program Teaching for Competence.

Remember to return your disk and complete the project quiz!

Click on the Quit button to end the program.

Quit

APPENDIX B

POSTTEST

Name_____TA_____Section_____

EDP 301 COMPUTER PROJECT QUIZ

Directions: Write your answers to the following items on the answer sheet. Do not mark on *this portion* of the test.

Part 1. Distinguishing Objectives from Activities

1. Which item best describes an instructional activity?
   a. ...solve long division problems.
   b. ...sound out and read new words.
   c. ...discuss in class historical events that preceded World War II.
   d. ...name four Shakespearean plays.

2. Which item best describes an instructional activity?
   a. ...tell time to the nearest five minute mark.
   b. ...contribute to a group mural depicting the Civil War.
   c. ...write a good business letter.
   d. ...name four well-known American Indian painters.

3. Which item best describes an instructional objective?
   a. ...practice multiplication tables.
   b. ...take the sixth grade class field trip to the art museum.
   c. ...say the primary sound for each letter of the alphabet.
   d. ...discuss in class reasons for World War I.

4. Which item best describes an instructional objective?
   a. ...read Chapter 3 in the science book.
   b. ...discuss in class the elements of a plot structure for a novel.
   c. ...with a group of classmates, draw a mural depicting a jungle.
   d. ...classify works of art by period.

Part 2. Identifying Worthwhile Objectives

5. Which objective is the most worthwhile for a primary-grade reading class?
   a. Given a list of new reading words that cannot be "sounded out" and a standard dictionary, the student will divide the words into syllables.
   b. Given a list of new reading words that cannot be "sounded out" and a standard dictionary, the student will correctly pronounce each word.
   c. Given a list of new reading words that cannot be "sounded out" and a standard dictionary, the student will place pronunciation marks on each word.
   d. Given a list of new reading words that cannot be "sounded out" and a standard dictionary, the student will phonetically spell each word.

6. Which objective is the most worthwhile for a violin class?
   a. The violin student will define the terms duet, trio, and quartet.
   b. Given the definitions for duet, trio, and quartet, the violin student will match the names with the appropriate definitions.
   c. The violin student will perform in a duet, trio, and quartet.
   d. The violin student will discuss duet, trio, and quartet.

7. Which objective is the most worthwhile for a spelling class?
   a. The student will alphabetize the new words in the spelling book.
   b. The student will spell the new words in the spelling book.
   c. The student will identify correctly spelled words from the spelling book, given a list of the new words spelled correctly and incorrectly.
   d. The student will write the new words from the spelling book in his/her notebook for future reference.

8. Which objective is the most worthwhile for a unit on telling time?
   a. The student will draw the hour and minute hand on the clock faces to represent given times.
   b. Given clock faces set at different times, the student will select the clock that depicts a stated time.
   c. The student will tell the teacher the time that recess begins.
   d. The student will state the time shown on pictures of various clock faces.

Part 3. Identifying Well-Written Objectives

9. Which objective is well-written?
   a. The student will identify the instruments commonly used in the orchestra.
   b. The student will label the parts of a flower given drawings of flowers.
   c. Given paper and pen, the student will write an original business letter in the format specified in class.
   d. The student will learn the importance of a balanced diet.

10. Which objective is well-written?
   a. The student will discuss how an electromagnet works.
   b. The student will know the theory of gravity.
   c. The student will type a business letter in proper format with no errors in grammar or spelling.
   d. The student will know how to apply the cardinal rules of grammar.

11. Which objective is well-written?
   a. Given descriptions of community helpers, the student will learn about fire fighters, police officers, and sanitation workers.
   b. Given color photographs of well-known paintings by Picasso, Chagall, and Dali, the student will name the artist and the title of each painting.
   c. The student will label the parts of the eye.
   d. The student will discuss the basic principles of salesmanship.

12. Which objective is well-written?
    a. The student will label all the nerves and muscles in the body.
    b. The student will know how to change the tire on an automobile.
    c. The student will state the three steps in the water cycle.
    d. The student will number a list of animals in proper order.

Part 4. Identifying Instructional Information

13. Which statement is most appropriate for enabling students to perform the objective?
    Objective: The student will name three primary colors (red, blue, yellow) when shown examples of each.

    Information:
    a. "Three of the primary colors are red, blue, and yellow."
    b. "Look at this block. This block is red. Say its color. (Repeat with blue and yellow blocks and other red, blue, and yellow objects.)
    c. "These blocks (displays blocks) are red, blue, and yellow. Tell which color is your favorite and why."
    d. "Class, break up into three learning groups. Group A find all the red objects in the room. Group B find all the blue objects. Group C find all the yellow objects."

14. Which statement is most appropriate for enabling students to perform the objective?
    Objective: The student will read the word "dog".

    Information:
    a. "This word (displays flashcard with the word 'dog' on it) is 'dog', one of the new words in our story today. How many of you have dogs at home?"
    b. "This word (displays flashcard with the word 'dog' on it) is 'dog'."
    c. "Our story today is about a dog. This is the word 'dog' (displays flashcard with the word 'dog' on it). We'll be reading a lot about all different kinds of dogs in the story."
    d. "This is the word 'dog' (displays flashcard with a picture and the word 'dog' on it). When you see the word 'dog' always think of this picture.

15. Which statement is most appropriate for enabling students to perform the objective?
    Objective: The student will list the steps in the scientific method.

    Information:
    a. "The scientific method is used to conduct research on observable phenomenon."
    b. "The steps in the scientific method are . . ." (here each step would be given).
    c. "Conduct the experiment set up at the lab table and list the steps that you follow."
    d. "Can anyone tell me the first step in the scientific method?" (Call on individual students to provide each step).

16. Which statement is most appropriate for enabling students to perform the objective?

Objective: The student will demonstrate appropriate behavior when attending a musical performance.

Information:
a. "Each of you should be on your best behavior when we attend the band concert."
b. "If you behave well at the band concert, you will get to stay on the playground for an extra 15 minutes."
c. "It is important to behave well at the band concert so you don't disturb others."
d. "When you attend the band concert you should pay attention and refrain from talking while the band is playing."

Part 5. Identifying Appropriate Practice

17. Which activity is most appropriate for providing practice for the objective?

Objective: Given descriptions of different sewing machine accidents, the student will state the safety rule that would prevent each accident.

Activity:
a. Have the student write from memory the five major safety rules for operating sewing machines and explain why they are important.
b. Have the student describe five sewing machine accidents that occur when the safety rules are violated.
c. The student will identify the five most important sewing machine safety rules from a list of 10 possible safety rules.
d. Have the student read descriptions of sewing machine accidents and state the safety rule that could have prevented each accident.

18. Which activity is most appropriate for providing practice for the objective?

Objective: Given a drawing of the human heart, the student will illustrate the flow of blood through each heart chamber.

Activity:
a. Students complete a worksheet in which they label the chambers of the human heart.
b. Students complete a worksheet which contains a drawing of a human heart. They are asked to use lines and arrows to indicate the flow of blood through the heart chambers.
c. Have students describe how blood flows through the chambers of the human heart.
d. Have students create a drawing of the human heart that illustrates the various chambers in the human heart.

19. Which activity is most appropriate for providing practice for the objective?

Objective: The student will use the card catalog to identify call numbers of given book titles.

Activity:
a. Students are given a list of ten books and asked write the call numbers of each book.
b. Students are given a list of ten books and asked to check each one out using the card catalog.
c. Students are asked to identify the call number of each of their ten favorite books.
d. Students are given ten cards from the card catalog and asked to list the title and call number from each card.

20. Which activity is most appropriate for providing practice for the objective?

Objective: Given the cost and weight of different brands and sizes of the same product, the student will identify the most economical buy.

Activity:
a. Students are asked to bring a box of cereal from home and asked to identify if it is an economical buy.
b. Students are given the cost, weight and size of three boxes of cereal and asked to identify the most economical buy.
c. Students are given a worksheet where they determine the cost and weight of three brands of cereal to identify the best buy.
d. Students are asked to visit their neighborhood grocery store to determine which brand of cereal is the best buy.

Part 6. Identifying Effective Practice Activities

21. Which activity would provide the most desirable practice for the objective, "The student will compute the amount of interest on any simple-interest loan, given the principal, interest rate, and time period for the loan."

a. Students complete group worksheets containing problems in which any three of the four loan factors (principal, interest rate, time period, and amount of interest) are given for several different simple-interest loans. The students compute the amount of the factor not given.
b. A banker is invited to visit the class as a guest speaker. She explains simple-interest loans to the students, then demonstrates how to calculate the amount of interest for different principal amounts, interest rates, and time periods.
c. Students complete a worksheet containing problems in which the principal, interest rate, and time period are given for several different simple-interest loans. Students compute the amount of interest for each loan.
d. In pairs, students are asked to obtain the relevant information, including principal, interest rate, time periods, and amount of interest, for a simple-interest loan actually made to their parents or some other individual(s). Each pair is asked to explain how the interest for their particular loan was computed.

22. Which activity would provide the most desirable amount of practice for the objective, "The student will write numbers with 4-9 digits when dictated?"
   a. Call on individual students to go to the chalkboard and write a 4-9 digit number dictated by the teacher. Repeat until all the students have written a number.
   b. Read the students a newspaper article that contains several large numbers (4-9 digits). Have the students write the number as the article is read.
   c. Dictate numbers (4-9 digits) to the class and have each student write the numbers as they are dictated.
   d. Call on pairs of students to go to the chalkboard. Ask one student in the pair to dictate a number (4-9 digits) for the other student to write on the board.

23. Which procedure would be the best way to call on a student during an oral practice activity?
   a. "Jose...(pause)...what sound goes with this letter?"
   b. "Everyone think about the sound that goes with this letter...(pause)...Jose, what is it?"
   c. "Who can tell me what sound goes with this letter?"
   d. "What sound goes with this letter, Jose?"

24. Which activity would provide the most desirable amount of practice for the objective, "the student will write the word names for given numbers?" (Note: the word name for 350 is three hundred fifty).
   a. Give each student a blank check with a number of dollars indicated. Have the students write the word names in the appropriate space.
   b. Give each student a number on a slip of paper. Call on individual students to write the word name for their number on the overhead projector for all to see.
   c. Give each student a list of ten numbers. Have them write the word name beside each number listed.
   d. Give each student a worksheet with the word names for twenty numbers. Have them write down the number for each word name.

Part 7. Identifying Effective Feedback Activities

25. You have called on Mary to name the capital of New Mexico. She makes no response. Which is the best comment to use in this situation?
   a. "Make a guess, Mary."
   b. "It's Santa Fe. Once more, Mary, what is the capital of New Mexico?"
   c. "Cassandra, can you tell Mary what the capital of New Mexico is?"
   d. "The Sante Fe Trail ends there, Mary. Now try it."

26. You have just called on Kiko to name the chemical compound symbolized by NaCl. She hesitates in making her response and you feel a prompt is in order. Which comment provides the best help in this situation?
   a. "It's something you use every day, Kiko."
   b. "Think hard, Kiko. It rhymes with calcium fluoride."
   c. "It's common name is table salt. What is its chemical name?"
   d. "Is it sodium chloride or potassium carbide?"

27. You call on Charles to state the steps in the water cycle. He correctly names two steps but cannot remember the third. Which is the best comment to use in this situation?
    a. "Charles, you are almost there. What is it that happens when water forms on the lid of a pan of boiling water?"
    b. "You named two steps, Charles. The third step is condensation. Now name all three steps."
    c. "You are missing one of the three steps, Charles. Who can tell Charles what the third step is?"
    d. "Charles, you named only two steps. Can you tell us the third one?"

28. You are calling on individual class members to give answers to a set of math problems. You ask: "What did you have for number two Willie?". He answers correctly. Which of the following would be best to say?
    a. "Good work, Willie. What did you get for the next one?"
    b. "Very good, Willie."
    c. "That's right, Willie. Now tell us how you got that answer."
    d. "O.K., does anyone have a different answer?"

Part 8. Identifying Appropriate Assessment Items

29. Which assessment item is the most appropriate for the objective?
    Objective: Given the letters p, d, b, and g, the student will say the name of each letter.

    Assessment:

a. Teacher: Hold up cards, one at a time with the letters p, d, b, and g. Ask the student, "What letter is this?"

b. Teacher: Hold up cards, one at a time with the letters p, d, b, and g. Ask the student, "What sound does this letter make?"

c. Teacher: Hold up cards, one at a time with the letters p, d, b, and g. Ask the student, "What words begin with this letter?"

d. Teacher: Hold up cards, one at a time with the letters p, d, b, and g. Ask the student to write each letter five times.

30. Which assessment item is the most appropriate for the objective?
Objective: Given a list of who, what, how, when, or why reference questions, the student will name an appropriate reference (world book, dictionary, etc.) for answering each question.

Assessment:

a. Name five reference books that can be found in the school library.

b. Answer the following questions.
   a. When was Abraham Lincoln born?
   b. Who is the Prime Minister of Canada?
   c. What is a synonym?
   d. Why does warm air rise?
   e. How do you pronounce syzygy?

c. State what books can be used to answer who, what, how, when, or why questions.

d. For each question below, name the type of reference book used to find the answer.
   a. When was Abraham Lincoln born?
   b. Who is the Prime Minister of Canada?
   c. What is a synonym?
   d. Why does warm air rise?
   e. How do you pronounce syzygy?

31. Which assessment item is the most appropriate for the objective?
Objective: The student will set up an attractive merchandise display in the school store, using appropriate signs.

Assessment:

a. Write a paragraph describing the six elements of an attractive merchandise display.

b. At the school store, have the student set up a merchandise display using appropriate signs.

c. Have the student set up a merchandise display in a section of the classroom.

d. Name the six elements of an attractive merchandise display.

32. Which assessment item is the most appropriate for the objective?
Objective: Name the four competition swim strokes, given filmed examples of each.

Assessment:

a. Name the four competition swim strokes in the spaces below.

b. Make a check (√) by the swim stroke shown in each example on the film.

c. Write down the name of the swim stroke after seeing each example on the film

d. Write a "C" by each swim stroke that is performed correctly and an "I" by each one performed incorrectly in the filmed examples.

Part 9. Identifying Well-Written Assessment Items

33. Which assessment item is well-written?
    a. The whooping crane is an _____.
    b. Number the following planets in the correct order.
       ____ Mercury ____ Mars ____ Saturn ____ Venus ____ Jupiter
    c. Congress meets in _____.
    d. Name four rights guaranteed by the Constitution of the United States.

34. Which assessment item is well-written?
    a. The Andes Mountains have an elevation of more than _____.
    b. Look at the clock. What time will it be 30 minutes from now?
    c. The men who wrote the Constitution provided different ways to change or amend it. Name two of them.
    d. The population of the United States is characterized by _____ and _____.

35. Which assessment item is well-written?
    a. List the following presidents in the order in which they served.
       John Q. Adams, Herbert Hoover, Franklin Roosevelt, William Howard Taft, Ulysses S. Grant, and Harry Truman.
    b. Match the following Spanish words with the English words that have the same meaning.

____ red	a. negro
____ blue	b. rojo
____ green	c. verde
____ black	d. azul

    c. There are four classes of instruments in an orchestra. Name one and discuss it.
    d. Pacific Ocean salmon spawn in _____.

36. Which assessment item is well-written?
    a. List some of the constitutional qualifications for the United States presidency.
    b. Compute the number of inches in three feet.
    c. Number these animals in proper order:
       ___ amoeba ___ frog ___ whale ___ man ___ ape
    d. Italy is a
       a. island b. isthmus c. peninsula

ON THIS PORTION OF THE TEST, WRITE IN THE SPACES PROVIDED FOR YOU BELOW.

Part 10. Writing Objectives

Directions: Write one instructional objective for each situation listed below. Each objective should be well-written and worthwhile.

37-38. Write an objective for teaching the skill of skipping rope.

39-40. Write an objective that describes the performance assessed with the following test items:

2 x 3 8 x 7 23 x 3 11 x 5 21 x 6

Part 11. Providing Information

Directions: Write the instructional information you would provide to enable students to perform each objective below.

41-42. Objective: The student will add pairs of fractions with like denominators. (e.g., 1/5 + 2/5 = 3/5)

Information: (write the information below)

43-44. Objective: Given the rate (speed) of a vehicle and the time it has traveled, the student will compute the distance. (Note: Distance = Rate x Time)

Information: (write the information below)

Part 12. Providing Appropriate Practice Activities

Directions: Write the appropriate practice for the objectives listed below.

45-46. Objective: Given the cost and weight of two or more brands of the same product, the student will identify the brand that is the most economical buy.

Practice: (write the practice item below)

47-48. Objective: Given pictures of hazardous work situations in the school shop, the student will name the hazards that are pictured.

Practice: (write the practice item below)

Part 13. Writing Assessment Items

Directions: Write an assessment item for each objective listed below.

49-50. Objective: The student will use proper hand signals (left, right, and stop) when riding a bicycle.

51-52. Objective: The student will name the three primary colors (red, blue, yellow), when shown examples of each color.

APPENDIX C

STUDENT ATTITUDE QUESTIONNAIRE

STUDENT ATTITUDE QUESTIONNAIRE

Name _____

Please answer the following questions. Circle one answer per item.

SA Strongly Agree
A Agree
N Neutral
D Disagree
SD Strongly Disagree

1. The program was easy. SA A N D SD

2. I would like to learn more about Competency-Based Instruction. SA A N D SD

3. I tried hard to do well in the program. SA A N D SD

4. I would tell other students to use this program if they wanted to learn about Competency-Based Instruction. SA A N D SD

5. Overall, I liked the program. SA A N D SD

6. I like this program better in computer form than if it were in book form. SA A N D SD

7. If I had to work on another computer program, I would prefer one that provided a lot of practice. SA A N D SD

8. I had control over what I studied in this program. SA A N D SD

9. I had enough opportunities to practice answering questions in the program. SA A N D SD

10. This was a good way to learn the content. SA A N D SD

11. I was able to adjust the program to get the amount of practice I needed. SA A N D SD

12. The program was:

Way too long A little long About right A little too short Way too short

13. In the future, what kinds of learning activities would you like to do?

Competency-Based Instruction on computers

Another subject on computers

Competency-Based Instruction without computers

Another subject without computers

BIOGRAPHICAL SKETCH

Heidi L. Schnackenberg was born in Claverack, New York on June 28, 1967. She attended the State University of New York at Potsdam where she earned a Bachelor of Music, with a minor in Spanish, in 1989. She taught elementary and preschool music in Kentucky, New York, and Arizona before pursuing doctoral studies in Learning and Instructional Technology at Arizona State University. Heidi received an Outstanding Teaching Award in 1994-95 and Graduate Academic Scholarships for 1995-96 and 1996-97 from Arizona State University. She also received the 1997 Association for Educational Communication and Technology Dean and Sybil McKlusky Research Award for Outstanding Dissertation Proposal. Heidi is active in both the Association for Educational Communication and Technology and the American Educational Research Association.

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